PRIVATE EQUITY, VENTURE CAPITAL AND PUBLIC FUNDING DURING THE POST-CRISIS PHASE: AN EXPLORATORY STOCKTAKING FOR GERMANY DURING 2010 TO 2012

Christian Schlamp, MBA, Dipl.-Bw. (FH)

Submitted for the degree of Doctor of Business Administration

Heriot-Watt University
Edinburgh Business School

12/2017

Abstract

During the initial phase of the financial crisis of 2008 and 2009, which spread globally (Bauer 2012; Kamin and DeMarco 2012; Prorokowski 2013) and hence affected the world's economy (Döhrn et al. 2009), Germany's gross domestic product decreased significantly by 5.1% in 2009 (Destatis 2013). Beside the GDP's decrease, this global recession was associated with a significant decline of Germany's private equity and venture capital market (EVCA 2013), and a declining innovation activity in Germany's economy during 2008 and 2009 (Rammer et al. 2014).

The aim of the present study was to examine Germany's economic, innovation and public funding policy, and Germany's private equity and venture capital market during the so-called post-crisis phase of 2010, 2011 and 2012. This topic was chosen due to the importance of innovation for economic growth (Schumpeter 1985; Schumpeter 1987), to examine the linkage between economic, innovation and public funding policy, and to supplement the earlier work of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010).

In accordance with Laughlin's approach of middle-range thinking (Laughlin 1995), the present examination based on a skeletal theory and a set of five presumptions regarding the developments during the post-crisis phase. These presumptions were developed in order to examine the German economic, innovation and public funding policy, and, furthermore, Germany's private equity and venture capital market. The first presumption argued that the government improved the most important research subsidies and the public funding programmes on the federal level for the support of small and medium-sized enterprises, innovation projects, enterprise founding and for private equity and venture capital investments. The second presumption argued that private equity and venture capital investors changed their investment strategy and investment behaviour during the post-crisis phase. The third presumption argued that the financial crisis affected the investment process of equity investors on the level of the deal flow, the deal screening, the negotiation and contracting, the monitoring and mentoring of portfolio companies and also on the level of investor's exit. The final presumptions argued that the so-called Alternative Fund Manager Directive affected the processes of deal-selection, deal screening and monitoring and that the implementation of the so-called Basel III accord affected the selection of industry branches during the process of deal-selection.

Qualitative and quantitative data were collected from a purposive selection of publications and a purposive selection of early-stage, public and semi-public investors in Germany. A focus of this research examination was on the so-called Mittelständische Beteiligungsgesellschaften, which operate in each federal state of Germany as a kind of self-helping institution for small and medium-sized enterprises. The analyses were carried out by means of qualitative content analyses and descriptive statistics. This procedure not only ensured research variety and flexibility but, moreover, allowed for comparison analyses. Two validation studies were carried out, one on the level of the entire sample and one on the level of the so-called Mittelständische Beteiligungsgesellschaften, to invite participants to comment on the most important survey results.

This examination contributes to the knowledge base as the study showed that the financial crisis caused a significantly increasing number of public funding political instruments. The examination also showed that the financial crisis did not lead to overall changes in investors' investment behaviour and investment strategy during the post-crisis phase. Moreover, the results showed that neither the transformation of the Alternative Investment Fund Manager directive nor the implementation of Basel III caused the expected effects. In addition, the results underlined that the management team is still held to be the most important aspect during the decision making process, with a stronger emphasis in that respect, and that the additional components of the investment process did not show untypical changes due to financial crisis related impacts. Moreover, the results underlined the differences between public and semi-public investors in comparison with the remaining market members in Germany’s private equity and venture capital market. The results also underlined the exceptional role of the so-called Mittelständische Beteiligungsgesellschaften in Germany’s private equity and venture capital market. Finally, the results showed that the so-called Kreditanstalt für Wiederaufbau, Germany’s most important public funding provider, still took an important role in the financing of small and medium-sized enterprises on the one hand and the financing of equity investments on the other hand.

Dedication

To my grandparents

Gesina and August-Wilhelm Mertes (†).

Acknowledgement

I would like to express my gratitude to my supervisor Professor Anthony Berry for his support and guiding arguments throughout the entire dissertation. His supervision and recommendations enhanced the research process in many ways but at the same time gave me the freedom to follow my own ideas and thoughts. I am also indebted to my second supervisor Dr. Bill Wallace for his support and recommendations during the phase of the research proposal. I would also like to record my appreciation to the reviewers of the DBA research committee at Edinburgh Business School for their critical eyes and almost challenging feedbacks during the research phase. I am also grateful to the approved learning partner of the Edinburgh Business School in Germany, Dr. Richard Reichel and his team for their great support, their cooperation and their flexibility all the time. I would also like to record my appreciation to all the investment managers who took part in the surveys, their valuable inputs and their motivating feedbacks. Special thanks go to the library of the University Mainz, the Hessian Library and the Federal Office of Statistics in Wiesbaden. They all played an essential role and supported in many ways. Finally, I want to express my deepest gratitude to Rosemarie and Hans-Jörg Reiter for the numerous motivating conversations and their open ears during the demanding four years.

ACADEMIC REGISTRY

Research Thesis Submission

Name*:*	Christian Schlamp		
School/PGI:	Edinburgh Business School		
Version: *(i.e. First, Resubmission, Final)*	Final	Degree Sought	Doctor of Business Administration

Declaration

In accordance with the appropriate regulations I hereby submit my thesis and I declare that:

1) the thesis embodies the results of my own work and has been composed by myself
2) where appropriate, I have made acknowledgement of the work of others and have made reference to work carried out in collaboration with other persons
3) the thesis is the correct version of the thesis for submission and is the same version as any electronic versions submitted*.
4) my thesis for the award referred to, deposited in the Heriot-Watt University Library, should be made available for loan or photocopying and be available via the Institutional Repository, subject to such conditions as the Librarian may require
5) I understand that as a student of the University I am required to abide by the Regulations of the University and to conform to its discipline.

* *Please note that it is the responsibility of the candidate to ensure that the correct version of the thesis is submitted.*

Signature of Candidate*:*		Date:	

Submission

Submitted By *(name in capitals):*	Christian Schlamp
Signature of Individual Submitting:	
Date Submitted:	

For Completion in the Student Service Centre (SSC)

Received in the SSC by *(name in capitals):*			
Method of Submission *(Handed in to SSC; posted through internal/external mail):*			
E-thesis Submitted (**mandatory for final theses)**			
Signature:		Date:	

Table of contents

List of tables

List of figures

List of appendices

Abbreviations

ABS	Asset backed securities
AG	Public limited company in Germany
AIFM	Alternative Investment Fund Manager
App	Appendix
BA	Federal Employment Agency in Germany
Bafa	Federal Office for Economic Affairs and Export Control in Germany
Bafin	Federal Financial Supervisory Authority in Germany
BEUR	Billion euro
BIS	Bank for International Settlements
BMBF	Federal Department for Education and Research in Germany
BMF	Federal Department of Finance in Germany
BMWi	Federal Department for Economic Affairs and Energy in Germany
BP	Business plan
BVK	German Private Equity and Venture Capital Association
CAPM	Capital-Asset-Pricing-Model
CEFS	Center for Entrepreneurial and Financial Studies

CEO	Chief Executive Officer
CESifo	Munich Society for the Promotion of Economic Research
CoC	Chamber of commerce
CPS	Cyber-physical system
CVC	Corporate venture capital
DBA	Doctor of Business Administration
DCF	Discounted cash-flow
DD	Due diligence
Destatis	Federal Agency of Statistics in Germany
Diff	Difference
Dipl.-Bw.	Diplom-Betriebswirt
DIW	German Institute for Economic Research/Berlin
EAF	European Angels Fund
EBS	Edinburgh Business School
EC	European Commission
ECB	European Central Bank
EEAG	European Economic Advisory Group

EFH	Europäische Fernhochschule Hamburg
EIB	European Investment Bank
EIF	European Investment Fund
EKD	Germany’s Protestant Church
EP	European Parliament
EPO	European Patent Office
ERP	European Recovery Programme
EU	European Union
e. V.	Registered association in Germany
EVCA	European Private Equity and Venture Capital Association
F&E	Research & development
FH	University of Applied Sciences
FRG	Federal Republic of Germany
GDERD	Gross Domestic Expenditures on Research and Development
GDP	Gross Domestic Product
GmbH	Limited liability company in Germany
Helaba	Hessian federal state bank

HR	Human resources
HSG	University of St. Gallen
HTGF	High-Tech Gründerfund
HTS	Hightech-Strategy
ICT	Information and communication technology
IFD	Private Equity Initiative in Germany
ifm	Institute for Small Business Research/University Mannheim
IfM	Institute for Small Business Research/Bonn
IKT	Information and communication technology
infas	Institute for Applied Social Sciences
IPO	Initial public offering
IT	Information technology
KAGB	Kapitalanlagegesetzbuch
KfW	Kreditanstalt für Wiederaufbau
KG	Limited commercial partnership in Germany
KMU	Small and medium-sized enterprise
LoI	Letter of intent

M&A	Mergers & Acquisitions
M&S	Marketing & Sales
MAC	Material-adverse-change-clauses
Max	Maximum
MBGs	Mittelständische Beteiligungsgesellschaften
MBI	Management-buy-in
MBO	Management-buy-out
Media	Media and entertainment
MEUR	Million euro
Min	Minimum
Mio	Million
MIS	Management information system
NAV	Net asset value
NS	No specification
ODD	Operational due diligence
PE	Private Equity
PLC	Public limited company

PPP	Public private partnership
PSI	Public and strategic investors
R&D	Research and development
RC	Residual category
RWI	Institute for Economic Research/Essen
RWTH	Technical University Aachen
SH	Schleswig-Holstein
SME	Small and medium-sized enterprise
SPV	Special purpose vehicle
TEA	Total early-stage Entrepreneurial Activity
Telco	Telecommunication
TEUR	Thousand euro
TUM	Technical University Munich
VC	Venture Capital
VDB	Association of German Guarantee Banks/Berlin
VOEB	Association of German Public Banks/Berlin
WACC	Weighted-Average-Cost-of-Capital

WHU	Otto Beisheim School of Management/Vallendar
ZEW	Center for European Economic Research/Mannheim
ZIM	Central innovation programme for SMEs

Chapter 1 The introduction

In summer 2008, Lehmann brothers and the biggest insurance company in the United States went into receivership. This introduced the beginning of the first financial crisis in the present century (Schulmeister 2009). This financial crisis spread globally and affected the financial sector and the real economy due to economies interdependence (Baur 2012; Kamin and DeMarco 2012; Prorokowski 2013). The decreasing economic activity and the contraction of the finance sector required extensive public measures for their recovery. The financial crisis finally caused an increasing public indebtedness, state debt crises and a currency crisis in Europe (Döhrn et al. 2009; Döhrn et al. 2012b; Destatis 2013). These circumstances are the basis of the present thesis which is concerned with Germany's economic, innovation and public funding policy and Germany's private equity and venture capital market during the so-called post-crisis phase of 2010, 2011 and 2012.

In the run-up of the financial crisis, Germany's economy developed rather successfully around the millennium turn, followed from a zero growth between 2002 and 2005, and a strong increase each in 2006 and 2007. Finally, Germany's economy decreased significantly by 5.1% in 2009 (Destatis 2013). During this decade, the development of Germany's private equity and venture capital market was examined by Zimmermann and Fischer (2003) for the period of 1999 to 2001, Achleitner et al. (2006) for the period of 2002 to 2004 and Achleitner et al. (2010) for the period of the financial crisis between 2007 and 2009. Initially, Zimmermann and Fischer (2003) argue that Germany's rather small private equity and venture capital market would be in a phase of development and would also suffer from gaps in early-stage, turnaround and smaller volume investments. At that time, the private equity and venture capital market was substantially subsidised by means of public co- and refinancing measures and also characterised from a larger number of support-oriented investors (Zimmermann and Fischer 2003). In the subsequent periods, Germany's private equity and venture capital market consolidated due to the crash of Germany's technological stock market segment, the so-called Neue Markt in 2002 (Ehren 2013), and also due to economy's decline. These circumstances initiated a shift in Germany's private equity and venture capital market from early-stage to later-stage investments in order to achieve competitive advantages. This development was accompanied with an increasing number of larger investment funds which were focused on larger investments in bigger-sized enterprises. Nevertheless, Germany's private equity and venture capital market was still in a phase of development with a remarkable proportion of smaller investment funds. In addition, the German

private equity and venture capital market still missed the demanded proportions for early-stage and smaller volume investments (Achleitner et al. 2006). Achleitner's subsequent examination (Achleitner et al. 2010) shows a further shift in later-stage investments and also underlines the relevance of public funding for the entire private equity and venture capital market. Moreover, Achleitner's research results (Achleitner et al. 2010) show that the private equity and venture capital market still suffered from funding gaps for early-stage but also for expansion related and for turnaround investments. Beside the decline of the entire private equity and venture capital market in Germany during the financial crisis (EVCA 2013), Achleitner et al. (2010) also mention an increasing hands-on mentality of investors, decreasing return expectations and an increasing number of failed contract negotiations due to crisis' impacts. These long-term developments since the millennium turn were accompanied with a declining number of shareholders (Fey 2014), a declining number of initial public offerings (Statista 2015) and a weak entrepreneurial (Metzger 2016) and innovation activity in Germany (Rammer et al. 2010; Rammer et al. 2014; Rammer et al. 2016).

In order to counteract possible financing constraints for technology-based enterprise financing and founding, the German government launched the so-called ERP-Startfund and the so-called High-Tech Gründerfund in 2005 (Achleitner et al. 2006; Renz 2014a). Furthermore, the German government felt compelled to develop a nationwide innovation strategy in order to boost the innovation activity and the technology transfer in Germany. This so-called Hightech-Strategy was launched in 2006 (BMBF 2010). Already at the time of the millennium turn but in particular during the initial crisis phase, the decreasing innovation efforts, the modest technology-transfer (Rammer et al. 2014) and the gap in equity financing (EVCA 2013) became visible. During the initial phase of the financial crisis, the German government launched several conjuncture programmes in order to stabilise Germany's economy and to recapitalise the German finance sector (Sachverständigenrat 2008; Heilemann and Wappler 2010). These crisis' measures, inter alia, resulted in increasing budgets for the most important research subsidies on the federal level and for the funding programmes of Germany's most prominent public funding provider, the so-called Kreditanstalt für Wiederaufbau (BMWi 2010; KfW 2010). Moreover, the German government either prolonged the investment period of public equity investment funds or increased their fund volume. In addition, the government relaunched the national innovation strategy (BMWi 2010).

These developments in the economy and the equity market in Germany raised the question regarding the further development of Germany's private equity and venture capital market on the one hand and the further progress of Germany's public funding policy during the so-called post-crisis phase of 2010 to 2012 on the other hand. Therefore, the aim of the present thesis was to examine the developments of Germany's economic, innovation and public funding policy, and the developments in Germany's PE and VC market during 2010, 2011 and 2012. This research aim was associated with three research objectives. The first objective was to examine Germany's economic and innovation policy during 2010, 2011 and 2012. The second objective was to examine the progress of public funding on the federal level for the financing of small and medium-sized enterprises, innovation projects, enterprise founding and equity investments. The third objective was to examine the German private equity and venture capital market on the level of market members investment strategy, investment behaviour and investment process.

These research aims and objectives were associated with five different presumptions as a kind of skeletal theory rather than a set of detailed hypotheses. This procedure of skeletal theorising in research examinations complies with Laughlin's approach of so-called middle-range thinking (Laughlin 1995). This research approach, which follows the Habermasian path of German critical theory, is based on the middle way of initial theorising and research methodology specification in research examinations. Rather than being to narrowed in its basic orientation, this approach, due to its middle way focus, allows for flexibility during the research progress and skeletal theory's possible enrichment and complementation. In that context, the first presumption of the present thesis argued that the financial crisis might have prompted the government to adjust the economic, the innovation and hence the public funding policy. In order to support small and medium-sized enterprises, innovation, enterprise founding and the technology transfer, the government should have improved and extended the public funding programmes on the federal level. This should apply for the most prominent research subsidies ZIM and KMU-innovativ, and the funding programmes of the so-called Kreditanstalt für Wiederaufbau for the financing of small and medium-sized enterprises, innovation projects, enterprise founding and equity investments. The second presumption argued along an increasing risk awareness of private equity and venture capital firms due to crisis' impacts. This increasing risk awareness should have prompted private equity and venture capital firms to change their investment strategy and their investment behaviour during the post-crisis phase. The third presumption is associated with the so-called investment process of private equity and venture capital investors, which in the core is composed of the deal flow for the acquisition of investments, the deal

screening for the review of business proposals, the contract negotiation of investments, the monitoring and mentoring of portfolio companies, and finally investor's exit (Engelmann and Heitzer 2001; Nathusius 2001; Feldmann 2007). Earlier research in that respect shows that the variables along these components changed their weight in accordance with the economic circumstances (Schneider 2003; Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010; Hummel 2011b). Thus, it was supposed that as a consequence of the financial crisis, some of these variables should have changed their significance during the post-crisis phase too. Presumption number four is concerned with the so-called Alternative Investment Fund Manager directive, which was adopted by the European Parliament as a consequence of the financial crisis. In that context, it was supposed that directive's transformation should have affected private equity and venture capital firms' processes of deal selection, deal screening and the monitoring of the portfolio companies. The final presumption supposed that the implementation of the higher minimum capital standards for banks, so-called Basel III, should have affected private equity and venture capital firms' selection of industry branches due to different industry branch related default probabilities.

Overall, the present thesis followed an objective-analytical and empirical research strategy (Grochla 1976) for theory building (Chmielewicz 1979) and was phenomenological in character. In order to ensure variety during the research progress and skeletal theory's possible enrichment in accordance with Laughlin's approach of middle-range thinking (Laughlin 1995), this examination based on quantitative and qualitative data sources and research methods. The first part of the analysis based on a purposive selection of publications from Germany's department for economic affairs, Germany's department for research and education and from the Kreditanstalt für Wiederaufbau. These publications were selected in order to analyse the German economic and innovation policy, and the progress of public funding on the federal level. This part of the examination was associated with qualitative content analyses. The second part of the analysis based on a structured survey to examine the investment behaviour, the investment strategy and the investment process of private equity and venture capital firms during 2010, 2011 and 2012. This survey based on a purposive selection of early-stage, of public and of semi-public investors in Germany. The survey results were analysed by means of descriptive statistics to describe the developments in Germany's private equity and venture capital market during 2010, 2011 and 2012. The sample frame composition and the descriptive analysis allowed for direct comparisons with earlier research studies on the one hand and comparison analyses between the group of early-stage investors and the group of public and semi-public investors on the other

hand. In order to expand the survey results, the third part of the examination based on a purposive selection of publications from Germany's association of private equity and venture capital firms. Two validation studies were finally carried out in order to validate the research results regarding the investment process, the directive for Alternative-Investment-Fund-Managers and Basel III. Such a research design seemed suitable to receive a comprehensive perspective regarding developments in the chosen research areas.

This research examination took a neo-institutional theoretical perspective in order to describe the private equity and venture capital market, the investment process and the issue of public funding. Earlier researchers already argued that the application of a neo-classical theoretical framework would not be appropriate in order to describe the private equity and venture capital market in general (Brinkrolf 2002; Reißig-Thust 2003; Röper 2004; Pankotsch 2005; Manchot 2010) or the financing of small and medium-sized enterprises and of innovation projects in particular (Niederöcker 2001).

This topic was chosen due to the importance of innovation for economic growth (Schumpeter 1985; Schumpeter 1987), to examine the linkage between economic, innovation and public funding policy, and to supplement the earlier work of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). Even though this research study is limited to descriptive results, this examination surely contributes to the existing knowledge base regarding the developments in Germany's private equity and venture capital market due to the focus on early-stage, public and semi-public investors.

The dissertation is divided into eight different chapters. The second chapter is initially concerned with financial crisis related developments, the economical relevance of small and medium-sized enterprises, innovation related particularities in Germany, and finally the financing of small and medium-sized enterprises and of innovations. The third chapter is then focused on financial theories and on the theoretical framework for the present thesis. The literature review in chapter four details the development of the private equity and venture capital market in Europe and Germany and presents the literature regarding the investment process and public funding. This chapter leads to a basic theory, a research question, the aim and the objectives of the present study. Chapter five is concerned with the different types of research methodologies and the research methodology of the present research study. The results and conclusions are presented in chapter six. Chapter seven is concerned with the discussion of the study outcomes and the final

chapter eight with the limitations of the present study and the recommendations for further research. The subsequent table one summarises the structure of the present thesis.

The thesis structure	
Chapter	Content
I	Introduction.
II	Financial crisis, SME and innovation related aspects.
III	Financial theories and thesis framework.
IV	Literature review, basic theory, aim and objectives.
V	Research methodology of the present thesis.
VI	Results and conclusions.
VII	Discussion of results.
VIII	Limitations and recommendations for further research.

Table 1 The thesis structure (own development)

Chapter 2 The present financial crisis

This chapter initially discusses the issue of the financial crisis with regard to the emergence, the progress and possible crisis' causes. Subsequently, the chapter presents the economic consequences of the financial crisis and the development of the economy during the post-crisis phase. This chapter finalises with the issue of the SMEs in Germany's economy, their research contribution and financing aspects regarding SME and innovations.

2.1 Basic assumptions regarding the financial crisis

The latest financial crisis, which was stimulated by fiscal policies and financial sector's deregulation, is still ongoing. In the run-up of the crisis, private banks expanded their credit volumes and bundled their credit portfolios in the so-called Asset-Backed-Securities. These ABS were sold as supposedly safe investments to private and institutional investors. The subsequent development of the financial market in the United States was described by an ongoing deregulation and weak credit-lending standards (Stocker 2009). Banks expanded their credit portfolios by accepting higher credit default probabilities of their debtors. Due to economy's positive development in the US, the credit standing of the so-called sub-prime market participants improved (Hoffmann and Köhler 2010). The subsequent economic development required the increase of the base rate by the US Federal Reserve Board in order to avoid economy's overheating. In the following periods share and house prices fell significantly and banks had difficulties in refinancing their credit portfolios. In summer 2008, Lehman Brothers and the biggest US insurance company went into receivership (Schulmeister 2009). This development resulted in the present financial crisis, which encompasses several single elements:

- a real estate crisis in the US;
- a global bank and economy crisis;
- state debt crises (Brunetti 2011).

Nevertheless, the present crisis is not a century specific phenomenon and the causes behind are not finally discussed. In that respect, Schularick (2011) analysed the differences between past crises and the current financial crisis and mentions altogether 71 different crises between 1870 and 2009. Regarding the similarities of these crises, he summarises that market and loan expansions were followed by bank crises and supplements that conjuncture downturns, as a

result of these crises, required central banks' interventions. This development increased the indebtedness of public households. Due to similarities in their development, Schularick (2011) finally concludes that wholesale financing, shadow banks, global imbalances and credit-financed speculation are the main causes of the latest financial crisis.

Another perspective regarding crisis' causes is based on Kamppeter's (2013) analysis, which starts with the end of World War II. He is focused on the time before and after the agreement of Bretton-Woods and argues that the end of this institutional framework introduced an era of debt, finance and real estate crises. The post agreement phase was associated with capital market's liberalisation, the expansion of credit volumes and the growing indebtedness of the private and of the public households. His argumentation has two sides. On the one hand, he refers to uncontrolled capital flows which resulted in high-frequent stock trading and huge market volumes. On the other hand, he refers to the development of real estate markets as a driver and an accelerator of crises. He points out that real estate markets are associated with the risk of unstable price developments. Therefore, he stresses the importance of institutional frameworks to hamper uncontrolled capital flows and to avoid speculation. Out of his point of view, the agreement of Bretton-Woods was such a suitable monitoring framework. With respect to the present financial crisis, Kamppeter (2013) also mentions the fixed currency system between the US and China as a possible reason. He points out that the economy in the US requires Chinese investments in US public bonds to refinance exports and to avoid US Dollar's devaluation. Instead of closing the gap between real investments and savings, the capital import has been spent for private consumption in the US. Van Treeck (2012) refers to the possibility of income inequality in the light of Rajan's (2010) findings. Rajan (2010) criticises that politicians would support debt financed consumption which, in the case of the US economy, means that private households kept their consumption stable during a period of income stagnation. By reducing their savings and by increasing their indebtedness, private households try to follow the consumption ability of the higher income groups.

Beside these institutional and economic argumentations, Bartmann (2011) refers to the particular responsibility of business data processing. He points out that most of the financial innovations are based on complex mathematical models. These models are transformed into specific technology systems for risk management or valuation purposes. Due to the lack of historical data, systems are unable to calculate future developments seriously and managers simply follow the results of the calculation. Furthermore, he concludes that managers simply follow the

calculations from the data systems without understanding their functionality. This reasoning underlines the thoughts of Kamppeter (2013) who also mentions that information technology systems are initiating herds behaviour, market volatility and high-frequent stock trading.

Thus, it seems difficult to determine one particular occurrence behind the present crisis rather than a chain of both institutional and economic weaknesses and relationships.

2.2 Ethical remarks regarding the financial crisis

Münch (2012) supplements the initial remarks in section 2.1 in relation to an ethical perspective. His argumentation is based on a dilemma in which market participants are captured. This double mill causes sub-ideal results. He argues in the light of the so-called prisoner dilemma which, as part of the game theory, tries to analyse several behavioural options and the importance of institutional frameworks. With respect to the current crisis, Münch (2012) concludes that the main reason behind its emergence is the interdependence between politics and financial institutions. He argues that the ongoing violation of European Union's contracts is a typical double mill, which will lead to an ongoing development of the financial crisis.

An additional ethical orientation by considering bible contents and metaphors is adopted by the EKD (2009). The German Protestant Church describes the current crisis along the development of a wall crack. In the beginning, the crack is invisible but it increases steadily and finally results in the wall's collapse. This development is associated with society's disorientation and the lack of confidence, which out of the church's point of view is the ethical fundament that holds the wall together (Huber 2009). The EKD (2009) refers to four different responsibility levels. The first is the responsibility of political institutions regarding capital market's deregulation. The second is the responsibility of the finance and the private industry sector which are focused on short-term profits. The third one is individuals' behaviour by asserting their interests without considering possible consequences and finally, the overall quick money mentality.

Obviously, different institutions, their interconnection and market participants behaviour supported the silent emergence of the present crisis and not only a particular event in isolation. Therefore, a basic understanding of the current crisis requires a comprehensive view which should lead to the assumption that the best possible contract framework and ethical fundament is ineffective as long as participants do not behave accordingly. One of the most important

problems behind this crisis is that basic effects spread around the globe and were not limited to a specific country or region.

2.3 Contagion channels of the financial crisis

Regarding possible contagion channels, Kamin and DeMarco (2012) call into question that direct financial linkages are as important as previously assumed. According to their research results, they found no evidence that direct linkages due to foreign investments in US mortgage backed securities and the foreign dependence on US Dollar funding are important factors behind the transmission of the crisis. Their conclusions are based on the quite small amount of ABS depreciation in comparison to the overall losses during the crisis. Therefore, they finally conclude that indirect channels should be responsible for the propagation of the crisis and refer to:

- financial institutions liquidity demand;
- herds behaviour due to similar business practices and models;
- financial institutions risk aversion.

These indirect channels resulted in the retreat from lending on the one hand and a decline in ABS sales on the other hand. Nevertheless, the degree of market integration enabled shock transmissions from one market into foreign markets, which was supported by weak institutional frameworks. Prorokowski (2013), who analysed contagion propagation in Europe, refers to the capital market on the one hand, and direct bank credit linkages on the other hand as contagion channels. He concludes that institutional equity sales in one market caused the decline of portfolio values from other market participants. Beside this interconnection of capital markets, he, furthermore, points out that the acquisition of eastern European banks by western European institutions resulted in direct bank credit channels. These direct channels are also responsible for the contagion of the financial crisis in Europe.

These researchers are focused on the contagion within the financial system but leave out the link between the financial sector and the real economy. Baur (2012) in that respect concludes that no country or industry sector could escape from the crisis' effects. Interestingly enough, he mentions that developed country firms have been more exposed to the global financial system than

enterprises in emerging markets and calculates that impacts caused by the global financial system were strongest in France, Italy, Switzerland, the UK and the US.

2.4 The economical consequences of the financial crisis

Economic effects of the financial crisis resulted in the decline of world's production output, falling raw material prices and a global recession. Protectionism in some countries accelerated the effect of decreasing trade activities and the decline in production's output (Döhrn et al. 2009). This development was associated with base rate reductions of the most important central banks. In the run-up of the financial crisis, institutional investors bought ABS in order to improve their profits (Hoffmann and Köhler 2010). During the further progress, savings, cooperative and in particular Germany's so-called Landesbanken realised significant losses due to such investments (Dietrich and Vollmer 2012). Therefore, after Lehman brothers' receivership in 2008, several rescue programmes were introduced to avoid bank sector's collapse. The German government agreed on rescue programmes in the amount of approx. 480 billion euros. Depending on audit results, distressed banks received guarantees, were allowed to transform risky assets or were recapitalised by silent equity investments of the state (Sachverständigenrat 2008). Interestingly enough, local savings and cooperative banks were less affected by the crisis since they have separated their investment bank activities. Thus, the major proportion of public guarantees and support in Germany refers to public or semi-public banks (Dietrich and Vollmer 2012).

Nevertheless, Germany's economy seemed somewhat unaffected for the time being. Germany's GDP increased by 3.3% in 2007 and still by 1.1% in 2008 but subsequently declined significantly by 5.1% in 2009 (Destatis 2013). On the other hand, Germany's unemployment rate remained rather stable and resulted in 9% for 2007, in 7.8% for 2008 and in 8.1% for 2009 (Bundesagentur 2013). This disproportional development could be explained by the increasing number of short-time workers from approx. 101,000 in 2008 to 1.14 million in 2009 (Bundesagentur 2012) as a consequence of the governmental measures.

Leading industrialised countries followed a course of expansive monetary and fiscal policies since fall 2008, and introduced extensive conjuncture programmes (Döhrn et al. 2009). Heilemann and Wappler (2010) mention two conjuncture programmes in Germany which were introduced at the end of 2008 and the beginning of 2009. These programmes combined fiscal

policy measures by increasing public investments on the one hand and the reduction of income taxes on the other hand. The main focus of the so-called conjuncture programme I in the amount of 11.6 billion euros was employment policy related. The conjuncture programme II in the amount of 45.9 billion euros referred to the reduction of taxes and social insurance contributions beside additional public investments. Finally, fiscal measures resulted in adjustments in the tax and social insurance system beside the reduction of public subsidies. These initiatives were supplemented by the so-called Wirtschaftsfonds Deutschland in the amount of approx. 115 billion euros to stabilise Germany's economy too. These governmental measures resulted in GDP contributions by approx. 0.5% each for 2009 and 2010 (Heilemann and Wappler 2010).

2.5 Economy's development during the post-crisis phase

Due to the extensive and joint stabilisation efforts, the world's economy developed positively during the last months of 2010. Beside the disproportional positive development in the emerging markets, the expansion in the industrialised economies proceeded comparatively in a moderate way (Döhrn et al. 2011). Beside the intensification of Europe's state debt crisis, the world's economy cooled down in 2011 again (Döhrn et al. 2012a). The ongoing state debt and bank crisis in Europe caused a decline in cross-boarder financing. Therefore, the ECB introduced several rescue programmes, beside a cash injection into Europe's bank system, each in the amount of 1,000 billion euros at the end of 2011 and the beginning of 2012 (Sachverständigenrat 2012).

Due to narrow trade relationships and intensive capital flows, world's economy was also negatively affected by the state debt crisis in Europe. This effect has been accompanied with the depreciation of the euro on the one hand (Döhrn et al. 2012b) and a loss of confidence in rescue measures of EU member states on the other hand (Döhrn et al. 2012c). In 2012, the world's weak economic development caused further consolidation efforts, resulted in unstable Euro zone prognosis and led to the end of the conjuncture programmes. On the other hand, the ECB continued the expansive monetary policy in order to stabilise the economy and the bank system. Nevertheless, due to the large investments of private banks in government bonds of distressed countries, the weak state solvencies were transferred to the bank system (Sachverständigenrat 2012). During the post-crisis phase, Germany's economy increased by 3.6% in 2010, by 3% in 2011 and by 0.7% in 2012 (Destatis 2013).

Nevertheless, beside the questions regarding bank systems stability and economies development, public concerns were also associated with the small and medium-sized enterprises in Germany. The majority of enterprises in Germany are small and medium-sized (Söllner 2011) and the subsequent sections are initially focused on their economic relevance, their innovation contribution and financing aspects.

2.6 The small and medium-sized enterprises in Germany

2.6.1 The significance of small and medium-sized enterprises

According to the SME classification of the European Commission (see table two in appendix B), approx. 99% of Germany's enterprises are small and medium-sized. In addition, approx. 61% of Germany's employees were employed in the sector of the SMEs in 2009, whose employment contribution developed positively in 2008 compared to 2007 (Söllner 2011). Beside this progress during the initial phase of the financial crisis, May-Strobl and Haunschild (2013), moreover, found out that SMEs realised a net employment increase by 14%, whereas bigger-sized enterprises realised net employment losses of approx. 1% between 2001 and 2009. Nevertheless, SMEs amount of job losses was twice as much in comparison to bigger-sized enterprises during the same period. It was concluded that SMEs compensated these job losses by expansion on the one hand and enterprise founding on the other hand. Hence, this development confirms the so-called SME hypothesis which argues that SMEs employment contribution would be bigger than the employment contribution of bigger-sized enterprises (May-Strobl and Haunschild 2013). Furthermore, the economic importance of SMEs is also explained due to their contribution in the qualification and innovation process. In Germany, SMEs contribution in the enterprise-based qualification system is rather large as the majority of trainees are qualified in enterprises with less than 500 employees. In addition, SMEs realise significant investments in fixed assets and their proportion on economy's gross value added resulted in approx. 50% in 2009 (Söllner 2011). SMEs are also important in the value chain of bigger-sized enterprises and prevent supply shortages in less structured regions due to their nationwide representation. However, research data show that the research and development contribution of SMEs is rather weak and hence their innovation potential is not completely exhausted (Hummel 2011a).

In that respect, SMEs are not only regarded as important in the innovation process but also for the diffusion of innovations in the economy. Schumpeter (1985) argues that the production

process in economies would always be moving towards the boarders of efficiency. The efficiency boarders are further moving due to the implementation of improved factor combinations by innovative entrepreneurs. With regard to the further development of economies, Schumpeter (1985) distinguishes between ordinary and innovative entrepreneurs, and between the economic circle and the innovation system. According to his clarifications, only the innovative entrepreneurs in the innovation system are regarded as important for the further development of the economy. He argues that only this type of entrepreneur would be responsible for the transformation of improved factor combinations and thus for the reorganisation of the economy (Schumpeter 1985). Schumpeter points out that it is this implementation of factor combinations and the diffusion of innovations which causes the conjuncture cycles. The ordinary entrepreneur, however, would simply produce goods and services in accordance with the market's demand. The economy moves in equilibrium until additional financial resources for new factor combinations are provided. This capital provision initiates economy's further development. Innovative entrepreneurs will realise significant pioneer profits if the factor combination and the transformation in new markets are successful. The process of factor transformation in the markets require additional capital. This additional capital proportion causes increasing prices due to the additional demand. The innovative entrepreneurs enter into the market, eliminate market barriers and initially step beside the ordinary entrepreneurs. In order to participate in the pioneer profits, further entrepreneurs are entering into the market by simply following the basic ideas of the pioneer entrepreneurs. This crowded entering of market followers further lowers the market barriers for subsequent entrepreneurs. Further entrepreneurs are entering into the market as long as it is possible to realise sufficient profits with the new products and services. This progress is associated with the diffusion of the innovation in the entire economy due to the crowd of market followers. Thus, the additional demand initiates a period of economic upturn which affects additional industry sectors and finally the whole economy. Both the increasing price level in the economy and the new products lead to decreasing profits of the ordinary entrepreneurs. This process is associated with the reorganisation of the whole economy due to the more efficient use of factor resources. The further development of the economy is hampered at that point where it becomes difficult to realise sufficient profits due to the crowd of market followers. On the other hand, the innovative entrepreneurs are able to repay their credits which initiates a period of credit deflation. The overall economic development slows down with lower price levels, decreasing demand and increasing unemployment. These unstable circumstances make it rather difficult to assess future developments and hence the entrepreneurial activity in the economy is declining too. The

economy tries to find an equilibrium again at which innovative entrepreneurs begin to implement new factor combinations again (Schumpeter 1987).

The central point behind Schumpeter's theory is the importance of the entrepreneur in the economy. The neo-classical theory on the other hand contradicts this importance of entrepreneurial activity and argues that economic growth is stimulated by an increasing capital stock. In the context of the current economic policies in industrialised economies, this capital stock increase is associated with additional expenses for education, research and infrastructure. Neoclassical assumptions argue that this increase would result in additional knowledge and that the transformation of knowledge would be based on routines. Schumpeter however remarks that it would not be possible to transform knowledge without entrepreneurial activity and thus contradicts the assumption of automatic knowledge transformation. He reasons that without innovative entrepreneurs, the economy would stand still without any growth perspectives (Röpke and Stiller 2006). Röpke and Stiller (2006) remark that the assumptions of Schumpeter nowadays are supported by the disintegration of societies. They argue that both the economy and the scientific area are operating separately. Hence, this disintegration of sub-systems also contradicts the possibility of knowledge transformation by routines, which is also difficult due to the complex scientific knowledge. Therefore, Röpke and Stiller (2006) stress the importance of innovative entrepreneurs for the successful transformation of knowledge.

Regarding the implementation and diffusion of innovation, SMEs benefit from short communication processes, motivated employees and management teams, and from their overall flat hierarchies. However, weak financial and personnel resources, the lack of project planning, project supervision and a weak market orientation hamper the innovation process in SMEs. The most important issue in that respect is the gap of financial resources. Under normal circumstances, innovation projects are associated with large costs, long-lasting investment periods and realisation risks. These particularities explain the gap of financial resources and SMEs avoidance of ongoing research and development. In most cases, SMEs are focused on one project rather than on several projects which increases the research risk significantly. In addition, SMEs are disadvantaged in hiring qualified staff and, moreover, suffer from increased fluctuation (Dömötör 2011). These reasons result in obvious differences in the innovation contribution of SMEs and bigger-sized enterprises which is clarified in the subsequent section.

2.6.2 Innovation specific developments in Germany

In order to assess the economic contribution of innovations, the literature distinguishes between several indicators and nomenclatures. Enterprises are classified as innovation active in the case they conduct research and development but without necessarily resulting in the introduction of new products, services or processes. Enterprises are also classified as so-called innovators in the case they launch or introduce:

- a new or improved product, service or process;
- a marketing method;
- an organisation method.

Enterprises which just modify existing products, services or processes are classified as so-called moderniser. Furthermore, the literature distinguishes between the so-called input, throughput and output indicators. The expenses for research and development are the most important input measure. Innovation efforts could result in the registration of patents or any other kind of proprietary rights, internal research routines and the employment of scientific staff. These variables are regarded as possible outcomes of innovation activities even though their registration is very difficult and does not show the final research success. Basically, these variables are neither regarded as necessary nor sufficient conditions for successful product launches. This means that not every patent is necessarily resulting in a product launch and not every product launch is based on a registered patent. Therefore, these variables are classified as the so-called throughput indicators. They do not allow for conclusions regarding enterprises' innovation intensity on the one hand or the innovation success on the other hand (Maaß and Führmann 2012). The final success of R&D is expressed by the revenue proportion of new or significantly improved products and services. The success of process innovations on the other hand is expressed by their contribution in the reduction of costs per unit. In the case that process innovations are introduced for quality improvements of products and services, their success is expressed by their contribution in additional revenues (Rammer et al. 2014).

The literature review shows that the innovation statistics have obvious limitations. Even though several research institutions in Germany are concerned with innovation research, an all-encompassing basic statistic is completely missing. Most of the research studies are limited to particular industry branches and enterprise sizes, and thus their results are not representative for

the entire economy. In addition, the research studies are based on self-assessments of the participating enterprises and hence on their knowledge regarding the application of innovation definitions. This supports the assumption that the statistics might be biased (Maaß and Führmann 2012).

In order to realise a basic understanding regarding the innovation ability of Germany's economy, the subsequent clarifications are based on the research study from Rammer et al. (2014). This longitudinal examination is carried out on behalf of Germany's department for education and research. The results are representative for the population of enterprises with more than five employees in selected industry branches. The study distinguishes between the so-called research-intensive industry with the chemical, the pharmaceutical, the electronics, the mechanical engineering and the automotive industry. Furthermore, the additional industries are in the fields of energy and water utility, mining and recycling. On the other hand, the study distinguishes between knowledge-based services from publishers, the film industry, IT companies, public relation agencies, tax, and the legal and management consulting firms. Finally, the study considers basic services from wholesalers, logistic firms, employment agencies and security companies. The agriculture, the fishing, the forestry, the construction industry, the retail, the educational service, the health care, the culture and the public sector are not considered in the examination. Nevertheless, the study delivers a comprehensive time series analysis regarding research and development in Germany's most important industry sectors (Rammer et al. 2014).

The subsequent table three shows that there are significant differences in the research and development activity of enterprises in Germany. The classification as continuously research active requires research and development divisions in the enterprise or at least R&D staff resources in order to ensure permanent research. Research data show that the proportion of continuously research active entrepreneurs is increasing in relation to the company size. This proportion is overall bigger in the industry than in the service sector and biggest on the level of industry firms with more than 1,000 employees.

The research and development activity in 2012		
Number of employees	Continuously	Occasionally
Industry sector		
5 – 49	12%	13%
50 – 249	33%	16%
250 – 999	61%	12%
1,000 <	83%	5%
Service sector		
5 – 49	7%	7%
50 – 249	10%	6%
250 – 999	16%	9%
1,000 <	37%	7%
Total	**11%**	**9%**

Table 3 The research and development activity in 2012; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2014, p. 15)

This research strategy is associated with comparatively smaller innovation expenditures of the SMEs for current and fixed assets, and for internal and external research and development. The proportion of expenditures is rising on the level of the bigger-sized enterprises (see subsequent table four) as does their proportion on continuously research (see table three). In addition, bigger-sized enterprises enter more often into research cooperation, both in the industry and in the service sector (see table five). Research cooperation is regarded as stimulating in the research process. Cooperating partners benefit from scale effects so that research efforts could finally be expanded (Dömötör 2011). This explains, inter alia, why public research funding is focused on the intensification of research cooperation, in particular on the level of the SMEs. This issue is discussed in greater detail in section 4.5.

The innovation expenditures' proportion on revenues in 2012[1)]		
Number of employees	Industry sector	Service sector
5 – 49	2.4%	1.0%
50 – 249	2.2%	0.8%
250 – 999	2.1%	0.7%
1,000 <	6.2%	1.7%
Total	**2.7%**	

1) Including expenses for current and fixed assets, internal and external R&D.

Table 4 The innovation expenditures' proportion on revenues in 2012; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2014, p. 16)

The research and development cooperation in 2012		
Number of employees	Industry sector	Service sector
5 – 49	18%	13%
50 – 249	34%	21%
250 – 999	57%	25%
1,000 <	88%	62%
Total	**18%**	

Table 5 The research and development cooperation in 2012; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2014, p. 19)

The statistic in the subsequent table six initially shows the proportion of innovation active enterprises in Germany. Innovation activities in that respect refer to every type of research effort during 2010, 2011 and 2012, irrespective of whether this effort was resulting in a product or process innovation. The information regarding the proportion of product innovators considers product innovations in the type of product inventions, product imitations and product improvements. This shows the rather comprehensive application of the term innovation. Process innovations are process implementations, either new or improved within the enterprise itself in order to reduce the costs per unit or for quality improvements of products and services. Innovations are considered in the statistic, in the case that an enterprise has introduced a product or process innovation at least at one occasion during 2010, 2011 and 2012. Table six shows that the proportion of innovation active enterprises and the proportion of product and process innovators is significantly increasing in relation to the company size. The proportions of the

bigger-sized enterprises differ significantly from the proportions of the smallest enterprises. Rammer et al. (2014) calculate a proportion of 51% innovation active enterprises and a proportion of approx. 38% product and process innovators in Germany for 2012. The application of continuously research, the scope of research cooperation and the amount of R&D expenses of the bigger-sized enterprises is associated with their larger proportions on both product and process innovations. This research strategy is also resulting in their significantly larger innovation success. This success proportion is increasing in relation to the company size with the exception of the service sector in which the smallest enterprises are obviously very successful. Nevertheless, the more detailed interpretation shows that from the total revenue proportions of 12.6% only 2.9% are associated with market innovations and approx. 9.8% with imitations. This means that approx. 78% of these revenue proportions are associated with product imitations. The revenue proportions of imitations are the biggest on the level of enterprises with five to 49 employees and both in the industry and the service sector (see table seven and Rammer et al. 2014, p. 17).

The innovation statistics for the industry and service sector in 2012			
Number of employees	Innovation activities	Product innovators	Process innovators
Industry sector			
5 – 49	53%	34%	22%
50 – 249	72%	50%	39%
250 – 999	83%	68%	57%
1,000 <	95%	87%	83%
Service sector			
5 – 49	46%	25%	18%
50 – 249	47%	27%	27%
250 – 999	62%	35%	44%
1,000 <	79%	61%	68%
Total	**51%**	**30%**	**22%**

Table 6 The innovation statistics for the industry and service sector in 2012; extrapolations for the population of enterprises in Germany with more than five employees
(derived from Rammer et al. 2014, p. 14)

The innovation success in the industry and service sector in 2012			
Number of employees	Product innovations	Process innovations	
	Revenue proportions	Proportion on cost reductions	Revenue proportion of quality improvements
Industry sector			
5 – 49	7.5%	1.1%	1.1%
50 – 249	9.2%	1.8%	1.4%
250 – 999	10.7%	2.8%	1.4%
1,000 <	27.4%	4.8%	2.4%
Service sector			
5 – 49	6.0%	1.9%	0.9%
50 – 249	4.7%	1.1%	0.8%
250 – 999	3.8%	3.2%	0.7%
1,000 <	9.6%	4.4%	2.6%
Total	**12.6%**	**3.3%**	**1.7%**

Table 7 The innovation success in the industry and service sector in 2012; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2014, p. 17)

Moreover, the subsequent table eight shows that the gross domestic expenditures on research and development increased without any interruption since the millennium turn. This applies for the absolute values and relative to Germany's GDP. The more detailed view, however, shows that the increase was not as large in the first half of the decade in comparison to the second half. In that respect, the GDERD increased by approx. 7% and thus by approx. 3.7 billion euros between 2001 and 2005, whereas these expenditures increased by approx. 19% and thus by approx. 11.1 billion euros between 2006 and 2010.

The gross domestic expenditures on research and development[1)]		
Year	Total GDERD in BEUR	GDERD proportion on GDP
2000	50.83	2.40%
2001	52.24	2.40%
2002	53.55	2.43%
2003	54.73	2.47%
2004	55.10	2.43%
2005	55.93	2.43%
2006	58.97	2.47%
2007	61.50	2.45%
2008	66.59	2.60%
2009	67.08	2.73%
2010	70.01	2.72%
2011	75.57	2.80%
2012	79.11	2.88%

1) Including expenditures from public and private organisations, and the private economy.

Table 8 The gross domestic expenditures on research and development (derived from table 1.1.1 on www.datenportal.bmbf.de, accessed August 2015)

Despite these obvious efforts to boost the innovation activity in Germany's economy, Rammer et al. (2014) calculate a decreasing proportion of product and process innovators from 47% in 2008 to 38% in 2012. This proportion of product and process innovators was largest in the IT, the telecommunication, the chemical, the pharmaceutical and the mechanical engineering sectors with proportions of each at least 70% in 2012. Moreover, approx. 44% of the enterprises implemented a marketing and/or organisation innovation in 2012. These so-called non-technological innovations are considered in the international innovation statistics since 2005. This kind of innovations are marketing and organisation procedures which are implemented by the respective enterprise for the first time. Rammer et al. (2014) mention that the proportions of marketing and organisation innovators decreased significantly between 2010 and 2012. In 2012, the amount of research expenses in the selected industry branches resulted in approx. 137.3 billion euros. A proportion of approx. 64% belongs to the chemical, the pharmaceutical, the electronics, the automotive and the mechanical engineering sectors. The expenses in these industry branches increased significantly between 2008 and 2012, but remained stable in the other industry sectors of the study. On the other hand, the statistic shows that approx. 105 billion euros and thus a proportion of 76% of the expenses refer to enterprises with more than 500 employees in 2012. Approx. 24.2 billion euros and thus a proportion of approx. 18% refer to

enterprises with less than 250 employees and the remaining proportion of 6% refer to enterprises between 250 and 499 employees. According to a company-size based perspective, the research expenses were decreasing on every enterprise-size level during the initial phase of the crisis. Subsequently, the research expenses were increasing from approx. 80 billion euros in 2010 to 105 billion euros in 2012. Thus, the expenses increased by approx. 31% on the level of the bigger-sized enterprises with more than 500 employees. On the other hand, the expenses remained quite stable each on the level of the enterprises with less than 500 and less than 250 employees (Rammer et al. 2014).

Beside the decline of the product, process, marketing and organisation innovators in Germany between 2008 and 2012, the revenue proportions of product innovations, which include innovations, improvements and imitations, decreased in every industry branch of the study during the initial phase of the crisis too. This proportion recovered in 2010 and 2011, but fell back again in 2012. The same development applies for the proportion of revenue increases due to quality improvements. The contribution of process innovations for the reduction of costs per unit ran volatile but overall tended to decrease during 2008 and 2012 with the exception of the basic service sector. On that level, these proportions slightly increased (Rammer et al. 2014).

Thus, the innovation activity in Germany's economy seemed to be hampered and the further development somewhat one-sided. The assumption of routines in order to transform knowledge into economical success might apply for particular industry branches and enterprise sizes but not for the entire economy. The past development shows that the pure increase of the capital stock in order to produce additional knowledge did not automatically result in an improved knowledge transfer nor in an increase of success proportions. Consequently, the application of the neoclassical assumptions is limited. This supports Schumpeter's conclusions (see section 2.6.1) that the transformation of knowledge requires entrepreneurial activity, not only by innovative entrepreneurs in the innovation system, but also from the existing enterprises in the economic circle. According to the research findings of Rammer et al. (2014), this means that in particular SMEs have to intensify their research efforts.

If only 11% of enterprises with more than five employees in the selected industry sectors carry out research and development continuously and approx. 9% of the enterprises occasionally, the vast majority of enterprises would not be research active at all. This applies in particular for SMEs in the industry sector with less than 250 employees and the service sector with less than

1,000 employees (see table three). In addition, the research data show that the majority of product innovators are concentrated in specific industry branches and employment classes. Approx. 94% of the research expenses refer to enterprises with more than 500 employees, which increased these amounts during 2010 to 2012 significantly. This means that the research contribution is overall concentrated and thus the innovation potential of the economy is not completely exhausted. This applies in particular regarding the specific type of innovation. In that respect, data show that the majority of revenues in the context of the transformation of innovations were based on product imitations. This underlines the earlier assumption of Welsch (2005) who argues that the innovation activity in Germany would be associated with the improvement of products and processes rather than the development of radical innovations. Therefore, Germany would belong to the group of fast followers with a high productivity and a successful diffusion of new applications in the important industry sectors. On the other hand, Welsch (2005) points out that Germany obviously would not be able to develop new markets and industry sectors. In that context, the structural change into high-technology areas would be too slow (Welsch 2005).

Schumpeter (1987) argues that the entrepreneur requires either credit or equity in order to implement new factor resources. Banks are operating between the owners of factor resources and the entrepreneurs. By receiving credits from banks, the innovative entrepreneur is able to buy the required resources for the further combination and their market introduction. This explains the central meaning of the capital and the credit market which are concerned with the redirection of factor resources into new applications. The process of economic growth does not only require factor resources but, moreover, enterprise founding and innovative entrepreneurs. In that respect, Röpke and Stiller (2006) argue that capital requires the connection to innovation and new knowledge requires the implementation in new factor combinations. Hence, if these requirements are not fulfilled, both the capital flow and the development of new knowledge would be meaningless. Therefore, the subsequent section is concerned with the application of financing measures for SME and innovation financing. In that respect, the clarifications are focused on public funding, capital market financing, equity financing and bank financing.

2.6.3 Small and medium-sized enterprises and innovation financing

Hummel (2011a), who was research active with regard to SME and innovation financing in Germany, argues that the modest technology transfer is due to a lack of applied research projects

and of cooperation between enterprises and research institutions. Nevertheless, he concludes that the gap in financing capital is the most important obstacle in the technology transfer. His research results show that self-financing by capital gains is the most important type of financing for SMEs in Germany. Even though placed on subsequent ranks, bank credits and overdrafts, supplier credits, depreciation and leasing are of importance too. This applies in particular on the level of enterprises between 50 and 249 employees which achieve revenues between ten to 50 million euros per year. Public funding, guarantees, factoring, private equity and capital market financing play a minor or absolutely no role in the financing of SMEs. Nevertheless, these results could not be regarded as representative for the population of SMEs in Germany due to the rather weak response rate of 1.4%. Overall, they show a basic direction regarding the financing of SMEs in Germany.

On the level of innovation financing, Hummel (2011a) distinguishes between project sizes up to 50,000 euros, 50,000 and 200,000 euros and above 200,000 euros in SMEs with no more than 249 employees. In that respect, self-financing is the most important financing channel too which applies for every project size. Bank credits, bank overdrafts and supplier credits are also important but, nevertheless, are on the subsequent ranks. The application of public funding is rather unimportant for projects up to 50,000 euros but, nevertheless, increases in relation to the project size. Public funding takes the second rank behind self-financing of projects above 200,000 euros. On the level of that project size leasing is also important, which could be explained due to investments in fixed assets for innovation projects. Capital market and mezzanine financing do not play any role in the financing of innovation projects (Hummel 2011a). However, this conclusion should be regarded with care as initially specified and might be a consequence of the particular research questions and project sizes.

Nevertheless, the results underline the obvious dependence of SMEs on self- and bank-financing. In particular, SMEs dependence on bank financing (ECB 2010; Destatis 2011; Hummel 2011a) should be regarded as critical for the further development of the economy. SMEs are disadvantaged by banks due the lack of securities, controlling and reporting instruments (Stefanovic 2009). Hummel's (2011a) research results confirm that the lack of securities and, moreover, the costs of bank financing are the most important obstacles for SME financing purposes. These issues are the most important on the level of enterprises up to 49 employees with less than ten million euros on revenues.

These circumstances should have intensified due to the contraction of the bank sector during the financial crisis (see section 2.4) and the modification of the minimum capital requirements for banks (BIS 2010). Thus, in order to receive bank credits for innovation or general financing purposes, SMEs have to expand their equity basis too. This underlines the assumption that alternative financing channels should be of future relevance for SME and for innovation financing purposes.

With regard to capital market financing, Hummel (2011a) refers to equity financing by shares or debt financing by corporate bonds. He argues that the application of these financing measures on the level of SMEs and innovation projects is limited. Hummel (2011a) remarks that an initial public offering in order to issue enterprise shares on the stock market is associated with transaction costs during the IPO and subsequently due to publication obligations and shareholder meetings. Corporate bonds on the other hand would be associated with large transaction costs too, and would also require minimum transaction volumes and positive ratings of the debtor. Due to these particularities, the application of capital market financing is surely limited for SMEs. Past developments of the capital market in Germany support the assumption that this financing channel is overall limited. This applies not only for SME and enterprise financing in general but in particular for the financing of innovative enterprises. In that context, the number of IPOs in Germany decreased from 142 to eight between 2000 and 2012 after standstills each in 2003, 2008 and 2009 (Statista 2015). This progress was associated by a declining number of shareholders in Germany from approx. 6.2 million in 2000 to 3.6 million in 2008. This number recovered and resulted in approx. 4.5 million shareholders in 2012 (Fey 2014). The development underlines the decreasing relevance of the capital market in Germany at least in the past decade, which, inter alia, explains the dependence of Germany's economy on the bank sector. With regard to the further development of the capital market in Germany, Blättchen (2015) points out that the German Stock Exchange is comparatively overregulated. He points out that this would apply in particular for this market segment which is regarded as SME friendly. Blättchen (2015) argues that this overregulation of the stock market would narrow its financing contribution, in particular for the financing of technology enterprises. In that respect, he argues that from the future on, investments from private shareholders would be limited. Possible market limitations would also be caused as nowadays private investors would be completely excluded during IPOs. On the other hand, the German Stock Exchange launched a so-called venture network for innovative enterprises (Blättchen 2015). This initiative was established in 2015, as a platform for capital seeking enterprises in the expansion or the pre-IPO phase (Deutsche Börse 2015). Thus,

these past and recent developments show that the potential of the capital market in Germany is not completely exhausted and limited due to additional regulations.

In accordance with the research results of Hummel (2011a), the application of PE and VC for SME and innovation financing is also limited. Based on an investor perspective, Hummel (2011a) argues that PE and VC investors are rather selective, are focused on particular types of enterprise sizes or industry branches, and, moreover, are investing in different life cycles. In addition, these investors have clear return expectations. Hence, these limitations make an overall application in the field of smaller enterprises difficult. On the other hand, Hummel's (2011a) research results show that the loss of autonomy represents the most important reason for SMEs to deny the application of PE and VC. The more detailed interpretation of Hummel's (2011a) results show that smaller enterprises up to 49 employees and ten million euros on revenues, simply have difficulties in receiving equity financing. The insignificance of equity financing in Germany is also underlined by the rather small volume of the German PE and VC market. Average calculations, which are based on the annual investments of domestic PE and VC firms in 2010, 2011 and 2012, show that investors in the UK realised approx. 18.8 billion euros on equity investments per year, investors in France approx. 6.8 billion euros per year and German PE and VC firms approx. 4.8 billion euros per year (EVCA 2013). In relation to these average calculations for 2010, 2011 and 2012, the German PE and VC market represents only approx. 26% of UK's market investment volume. More detailed calculations in that respect are introduced in section 4.1. The comparatively smaller PE and VC market in Germany could also be an explanation for the large proportion of public support in the German PE and VC market. This applies not only for early-stage but also for later-stage investments of PE and VC firms (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). These issues are discussed in greater detail in chapter four.

With regard to public funding for innovation purposes, the research results show that their importance is increasing in relation to the project size. Public funding takes the second place after self-financing on the level of projects above 200,000 euros. Even though the sample members complain due to long-lasting processing procedures, they appreciate the cost advantage of public funding. On the other hand, public funding is of minor importance for SME financing in general (Hummel 2011a). A more detailed interpretation regarding public subsidies from the federal level for innovation projects is shown by the research results from Belitz et al. (2012). Their research show that the amounts of research grants for SMEs which are issued by federal

departments more than doubled between 2005 and 2010. In that respect, these research grants without the contribution of the defence department increased by approx. 17.6% from 2005 to 2007, and by approx. 57.9% from 2008 to 2010 (Belitz et al. 2012). Furthermore, they agree with the research findings of Hummel (2011a) that self-financing would be the most important source for SMEs regarding the financing of innovation projects. They calculate that approx. 69% of the R&D expenses are self-financed by cash-flows or reserves, approx. 25% by public subsidies and approx. 6% by both private and public bank loans. Nevertheless, it should be considered that these results are limited to those enterprises which received public subsidies from the German economic department and the department for education and research between 2005 and 2010. Thus, these results are not representative for the entire economy.

These basic clarifications regarding SME and innovation financing in Germany show that there is a large dependence of SMEs on their self-financing capacity and on bank financing. Schumpeter (1985 and 1987) argues that enterprise financing is important, not only for the implementation of factor combinations but also for the diffusion of innovations. Therefore, financing constraints could be regarded as rather critical for the further development of the economy.

Nevertheless, the successful transformation of technologies and the reorganisation of the economy also require entrepreneurial activity. Research data show that the relation of enterprise foundings and liquidations ran from an annual surplus of 54,000 in 2005 to an annual loss of 24,000 in 2012. This information is derived from enterprises which are either registered in the trade register or employ at least one employee. Enterprise foundings in the agriculture sector, freelancing and sideline foundations are not considered. This significant decline is accompanied with a decreasing number of sideline foundations, which decreased from a surplus over liquidations from 131,000 in 2005 to 84,000 in 2012 (IfM 2014). On the other hand, the number of freelancers increased by 130% between 1994 and 2014 (Welter 2015). Welter (2015) argues that the founding behaviour has changed due to the technological possibilities and society's development. This means that nowadays enterprise founding in its simplest way would just require knowledge, networks and internet access. She (Welter 2015) concludes that the barriers for enterprise founding would be lower than in former times and enterprise founding in general would be more project oriented. Thus, the relevance of financing capital on the one hand and specific requirements regarding the entrepreneur on the other hand would have stepped aside. Even though Germany obviously suffers from a decreasing proportion of commercial enterprise

founding, Welter (2015) concludes that the present enterprise foundings would fulfil their economic role. Enterprise foundings would not only stimulate competition and thus would initiate the further development of the economy but would also prompt the bigger-sized enterprises to carry out ongoing research and development.

This is surely a simplification of reality by considering the R&D activity in Germany between 2008 and 2012. Welter (2015) qualifies the contribution of the freelancers in the economy and points out that the proportion of freelancers which permanently work without any employees increased by 83% between 1992 and 2012. Thus, it could be assumed that freelancing is more of an employment alternative due to economy's development in Germany after the millennium turn. The value added of this increasing number of freelancers is surely too small in order to compensate for the gap of commercial company foundings. In economic terms, it could be concluded that there is not only a decreasing entrepreneurial activity, which is associated with an increasing number of freelancers, but that Germany also suffers from a decreasing innovation success (see section 2.6.2) and a capital gap for SME and innovation financing (see section 2.6.3).

2.7 Chapter summary

The basic clarifications regarding the financial crisis have shown that typical financial crises have an overall similar pattern. The different research studies and commentaries regarding the present financial crisis refer to different crisis' causes but underline the assumption that neither an isolated blaming of specific countries, regions nor of specific institutions seems appropriate. Hence, a basic understanding of the present financial crisis requires a more sophisticated perspective which supports the assumption that the strong connection of societies, economies and financial institutions in the whole world might be the reason for the current crisis. The different expectations and strategies of societies sub-systems, countries and market protagonists contributed to the emergence of the financial crisis. The further progress has also been supported by a lack of effective cooperation and monitoring authorities. Consequently, the crisis spread around the world and finally reached the real economy. No country or industry branch could escape from the effects of the crisis which resulted in the substantial economic decline (see sections 2.1, 2.2 and 2.3).

Furthermore, the literature showed that the latest financial crisis resulted in a bank crisis, a global recession and state debt crises. Worldwide economic programmes were launched to stabilise both the financial system and the economy (see section 2.4). Germany's banking sector and economy, even though quite robust in the beginning of the crisis, could not permanently escape from crisis' impacts. The ongoing progress of the crisis in Europe required additional measures from the ECB to stabilise the entire Euro zone on the one hand and the euro on the other hand. After a short period of recovery in 2010 and 2011, Germany's economy fell back in 2012 again (see section 2.5).

The literature has also shown that approx. 99% of Germany's enterprises are small and medium-sized in accordance with the classification system of the European Commission. This type of enterprise size is not only regarded as important for employment and qualification but, moreover, for the diffusion of innovation in the entire economy (see section 2.6.1).

With regard to innovation specific developments in Germany, the statistics show that the innovation activity, the expenses for research and development, and the research cooperation is increasing in relation to the company size. This development is not only resulting in comparatively larger proportions of product and process innovations on the level of the bigger-sized enterprises but also in a considerably larger innovation success. This applies both for product and for process innovations. The study of Rammer et al. (2014) supports the assumption that the innovation activity is concentrated on specific industry branches and enterprise sizes. This research study from Rammer et al. (2014) shows that the major proportion of research expenses is associated with specific sectors on the one hand and enterprises with more than 500 employees on the other hand. This assumption is supported as the research expenses on the level of enterprises with more than 500 employees increased during 2010, 2011 and 2012, whereas the smaller employment classes kept this proportion stable. Even though the gross domestic expenditures on research and development increased by approx. 19% between 2008 and 2012, it was obviously not possible to stimulate the economy in that respect. This is shown by the decreasing proportion of innovators on the one hand and the decreasing success proportions of innovations on the other hand (see section 2.6.2).

Furthermore, research data show that self-financing is the most important financing resource for SMEs. This applies both for general and for innovation financing purposes. Nevertheless, SMEs are also dependent on bank credits and overdrafts. The application of specific financing

measures, such as mezzanine capital, leasing or depreciation is of comparatively smaller relevance. Public funding is rarely considered for SME financing purposes. With regard to innovation financing, the importance of public funding increases in relation to the project size. Capital market financing is of virtually no importance for SME and innovation financing due to size requirements. Equity investments from PE and VC firms are rarely considered due to investors' requirements and entrepreneurs' reservations but might also be a consequence of market limitations in Germany. In the field of public research subsidies, research data show that public institutions were increasing the expenses for research grants significantly between 2005 and 2010. These developments were accompanied with a decreasing proportion of enterprise foundings between 2005 and 2012. Even though the proportion of freelancers in Germany's economy increased until 2014, it is concluded that Germany suffers from a gap in entrepreneurial activity, a capital gap for both SME and innovation financing, and also from a weak technology transfer (see section 2.6.3).

The present thesis is focused on the development of the German PE and VC market in the field of SME and early-stage financing, and public funding on federal level for SME and innovation financing, start-up financing and equity investments. In order to describe these examination areas, the subsequent chapter is concerned with the development of an appropriate theoretical perspective for the thesis.

Chapter 3 The financial theories

As a first step, the chapter is focused on the differences between the neo-classical and the neo-institutional financial theory. In the subsequent sections, the theoretical perspective of the present examination is derived from earlier examinations of doctoral researchers. The first section starts with the historical development of financial theoretical argumentations.

3.1 The historical development of the financial theories

The traditional financial theory is focused on the production process. Financing fulfils a support function to enable the production process (Rudolph 2006). The amount of investment capital depends on the demand in the production process. The theory considers enterprises as social organisations in order to produce goods and services according to the economic principle. Hence, enterprises are concerned with satisfying the needs of both private households and enterprises without wasting resources. In the following periods, the economic theory left the path of demand-oriented goods production. Production processes were optimised in order to realise competitive advantages by mass production. This phase of industrialisation was accompanied with the origin of large banks, which ensured the future economic development. Nevertheless, the earlier orientation on goods flow, as the basis for financing decisions, was still valid. In the subsequent periods, market saturation due to mass production required both the optimisation of the production and the financing process. Hence, the overall economic development during the periods after the past war laid the basis for the modern financial orientation. Since then, investment decisions are realised from a profit point of view (Schmidt and Terberger 1997). The traditional financial orientation denies the issue of profit maximisation. The modern orientation, on the contrary, considers enterprises as institutions to maximise profits from entrepreneurs and investors (Rudolph 2006). This financial orientation is concerned with two different theories, the neo-classical theory on the one hand and the neo-institutional theory on the other hand. Both theoretical orientations are clarified in greater detail in the subsequent sections.

3.1.1 The neo-classical financial theory

The neo-classical financial theory is based on the assumptions of both complete and perfect capital markets. Capital markets are perfect under the following assumptions:

- equal interest rates for savings and credits;
- non-limited capital consumption for every market participant;
- free capital market access;
- no taxes and transaction-costs;
- equal information level of market participants;
- every type of cash-flow is divisible, tradable and assessable (Rudolph 2006).

On the other hand, capital markets are imperfect if transaction-costs result in differences between sales and purchase prices. In incomplete capital markets on the other hand, the tradability of specific financing measures is not possible and thus such markets suffer from financing gaps. Nevertheless, capital markets only address and solve divergent financial preferences. Non-financial preferences of market participants are not considered and could not be solved (Schmidt and Terberger 1997).

3.1.2 The neo-institutional financial theory

The theory denies the assumption of perfect and complete capital markets. Market protagonists behave rationally and follow subjective aims in order to maximise their profits (Rudolph 2006). Difficulties in the market are caused by information asymmetries between market participants. Therefore, suitable institutions are required to handle these information asymmetries. These institutions are associated with transaction costs. Depending on their specific amount, some transactions are not carried out. In that case, capital markets are classified as incomplete. Therefore, the neo-institutional theory is concerned with the analysis of organisations or institutional frameworks, regarding their suitability to settle information risks (Schmidt and Terberger 1997). The analysis is focused on suitable contracts, incentive measures and institutions (Rudolph 2006). Even though the neo-institutional theory denies the existence of both perfect and complete capital markets, the theory tries to come closer to perfect conditions by developing most suitable institutional frameworks (Schmidt and Terberger 1997).

The neo-institutional theory is associated with the following theoretical orientations:

- the theory of property-rights;
- the principal agent theory;
- the issue of information asymmetry;

- the issue of transaction-costs;
- the contract theory (Schefczyk 2004).

The examination process of the neo-institutional theory is focused on first best solutions without transaction-costs. Second best solutions, as a result of transaction-costs, could be improved by effective institutional frameworks. Therefore, the analysis process of the theory is not solely concerned with direct relationships but also considers financial intermediaries in order to receive virtually first best solutions. Even though different in their approach, each perspective is concerned with institutional frameworks to handle risks and to avoid or to reduce transaction-costs (Schmidt and Terberger 1997).

The subsequent section clarifies the particularities of each approach.

3.1.3 The components of the neo-institutional financial theory

The theory of property-rights is focused on the analysis of rights on goods and services. In that respect, contract rights refer to the use, the earnings, the modification or the disposal of goods and services (Rudolph 2006). According to the property-rights theory, the contract serves as the institution to allocate particular rights and obligations of each contract partner (Schmidt and Terberger 1997). As the value of goods and services is also determined by property-rights, the theory analysis contract's efficiency (Rudolph 2006). Inefficiencies are caused by the distribution of property-rights between contract partners. With regard to the analysis of contracts, different constellations of property-rights are compared on the basis of their individual transaction-costs (Schefczyk 2004).

The principal-agent theory, on the other hand, is focused on the relationship between the principal and the agent. Under the assumption of different information levels between contract partners, relationships are uncertain. In that context, investors are always exposed to the risk that agents are focused on the maximisation of their own profits rather than on firm's interests. The principal-agent theory is therefore focused on the analysis of risks due to information asymmetry and recommends suitable contract designs (Brunner and Kehrle 2012).

Information asymmetry is associated with the particularities of:

- adverse selection;
- moral hazard;
- hold up (Brunner and Kehrle 2012).

In the case of adverse selection, the agent benefits from an information advantage (Rudolph 2006). The principal is unable to assess the real quality of a good or service on the market (Schmidt and Terberger 1997). The issue of adverse selection is based on Akerlof's (1970) lemons theory regarding the used car market. He argues that good car qualities would withdraw from the market as potential customers, due to the information gap, are unable to assess the real quality of a car. Consequently, their bid prices are based on average quality assumptions and do not reflect the full value of a specific car. Due to different price expectations, the vendors of high-quality cars are withdrawing from the market. Thus, the customers are exposed to the risk of negative selection due to the remaining poor quality cars (Rudolph 2006). The issue of moral hazard, on the other hand, describes the principal's uncertainty regarding the agent's behaviour in the post-contract phase (Brunner and Kehrle 2012). This uncertainty refers to the reduction of agent's work performance or consumption on the job (Rudolph 2006). The issue of hold up is a further phenomenon in the post-investment phase. In that respect, there is always the risk of opportunistic behaviour of the contract partners due to contract gaps. Hold up describes a situation in which one contract partner could threaten with a contract termination in the case that contract conditions are not improved. This risk is most relevant in the case of very specific investments whose alternative use is impossible (Brunner and Kehrle 2012).

With regard to the PE and VC market, PE and VC firms are also exposed to these risks of adverse selection, moral hazard and hold up. In order to address these risks, Klier et al. (2009) point out that deep industry knowledge is suitable to reduce the problem of asymmetric information. They argue that well informed investors are able to create a situation of both empathy and trust more easily. In addition, the reputation as an informed investor supports the process of deal origination in networks. Furthermore, Klier et al. (2009) argue that informed investors are able to understand the business and strategy of their portfolio companies more efficiently. Therefore, Klier et al. (2009) point out that agency costs could be reduced due to the focus on particular industry lines. Agency difficulties in PE and VC markets are typically associated with the misjudgement of agent's qualification and motivation, consumption on the job and entrepreneur's exaggeration regarding the enterprise's future development (Schefczyk 2004). As the principal-agent theory is focused on moral hazard (Schmidt and Terberger 1997),

the theory supports the development of incentive measures to reduce agency costs (Rudolph 2006). Moon (2006) stresses the development of incentive plans as a key part in the investment process of PE and VC firms. This is required as necessary in order to align the interests between shareholders and the management team. Additional incentives could be paid in the case of extraordinary performance of the management team. Incentives are regarded as essential for an effective corporate governance of the portfolio company. In addition, the management team could be obliged to invest own funds. In that case, the management team directly participates on value creation or value losses, beside the performance-based linkage of their own income (Klier et al. 2009).

The transaction-cost theory is based on the work of Coase (1937) and focused on the advantages of internal in comparison to external production. Under the assumption that external production generates additional costs, these additional expenses could be compensated by the advantage of internal production. Further developed by Williamson (1975) into a contract theory, the transaction-cost theory distinguishes between ex ante and ex post transaction-costs. Ex ante costs are depending on the negotiation of contracts. Post-investment costs on the other hand, are caused by monitoring and the renegotiation of contracts. The basic assumptions of this theory are concerned with limited rationality and opportunistic behaviour. As contract partners are unable to assess every possible consequence, contracts are incomplete. Therefore, contracting parties could take advantage of contract's incompleteness. Additional transaction-costs arise in the case of legal enforcement and the renegotiation of contracts. In order to reduce such additional expenses, the theory is focused on the analysis of suitable institutions and contracts (Brunner and Kehrle 2012). The amount of transaction-costs is dependent on the uncertainty, the frequency and the specificity of transactions. The degree of these determinants is addressed by different types of institutional arrangements and contracts. A major concern is the issue of investment specificity. This means that there is always a risk of sunk costs due to specific investments as an alternative use would not compensate possible losses. In financial relationships, the so-called theory of incomplete contracts is concerned with possible risks due to specific investments and the renegotiation of contracts (Rudolph 2006). Schefczyk (2004) remarks that VC and PE related contracts are incomplete contracts. This type of investment requires renegotiation and monitoring, and thus produces transaction costs. The application of the neo-institutional financial theory is also described in appendix I (see figure eight).

The theory application is discussed in the subsequent sections. Therefore, earlier doctoral researchers are initially evaluated which finally results in the development of the theoretical framework of the present thesis.

3.2 The application of financial theories in private equity research

The majority of reviewed researchers deny the suitability of the neo-classical financial theory to describe and hence to understand PE and VC. On the contrary, researchers refer to the application of the neo-institutional financial theory as the appropriate theoretical foundation (Niederöcker 2001; Brinkrolf 2002; Reißig-Thust 2003; Röper 2004; Pankotsch 2005; Manchot 2010). Depending on their research focus, some researchers consider additional theories (Pfaffenholz 2004; Röper 2004; Pankotsch 2005; Kranz 2008).

Niederöcker (2001), who was research active in the field of SME and innovation financing, points out that the neo-classical approach is unsuitable to describe and to explain the PE and VC market. She argues that the assumptions of perfect and complete capital markets do not apply in particular in the case of SME financing. She points out that the following particularities of SMEs would contradict the assumptions of the neo-classical financial theory. First, the limitations of capital markets regarding the tradability of specific shares and, moreover, financial markets' entrance barriers. Second, the increased search and information costs due to the lack of comparable data for firm valuation purposes. Third, the degree of insolvency risk and finally, the amount of transaction-costs in comparison to bigger-sized companies. Niederöcker (2001) argues that SMEs do not have enough market power. SMEs are unable to reduce costs of capital funding by economies of scale due to their smaller capital demand and the small extent of repetition. Therefore, she concludes that the neo-classical financial theory is not applicable. Niederöcker (2001) also points out that the extent of financing measures in the field of SMEs is overall limited. Hence, the particularities of SME financing (see section 2.6.3) contradict the assumptions of perfect and complete capital markets (see section 3.1.1).

Röper (2004), who was research active in the field of corporate venture capital, also denies the suitability of the neo-classical theory. He points out that the degree of information asymmetry between entrepreneurs and investors in the venture capital market is associated with increased search and information costs. The degree of information asymmetry depends on the type of innovation on the one hand and the lack of past company data on the other hand. The difference

in the information level between market participants contradicts the assumptions of the neo-classical financial theory. Beside transaction-costs prior to the investment decision, VC investments are concerned with additional costs for monitoring and mentoring. Even though Röper (2004) points out that the particular investment risk could be partly compensated by additional in-depth information. He argues that VC markets are highly illiquid markets which hamper the tradability of investments due to technological and entrepreneurial risks. In that respect, he refers to the issue of the so-called living dead investments. According to Röper's (2004) point of view, it is rather difficult to estimate both future cash-flows on the level of each investment and the whole investment portfolio. Despite the fact that it would be possible to calculate cash-flow probabilities, there is always the problem of results moment and variance. He clarifies that approx. 30% of the portfolio is associated both with the so-called winning and living dead investments, whereas the remaining 40% is associated with the so-called losing investments. This means that at the end of the fund's period, approx. 50% of the portfolio's value is realised by approx. 7% of the investments. This underlines the particularity of VC investments which are associated with increased insolvency risks on the one hand and different risk and return expectations from entrepreneurs and investors on the other hand. Therefore, Röper (2004) concludes that the assumptions of the neo-classical theory are overall not met by VC markets.

With regard to innovation financing, Niederöcker (2001) refers to the following specific investment risks. The first one is the problem of forecasting. The second one is the stop or go decision regarding product's development and the final one is the uncertain capital demand. She points out that the specific investment risk is dependent on the technological knowledge of the founders and their management capability. Therefore, she concludes that capital markets in the field of innovation financing are comparatively imperfect.

Reißig-Thust (2003) analyses the difficulties in the relationship between VC firms and start-up companies. She examines the difficulties in every step of the investment process which are caused by information asymmetry and different objectives of investors and entrepreneurs. Reißig-Thust (2003) overall agrees with the assumptions of Niederöcker (2001) and Röper (2004) with respect to VC financing. In particular, she points out that the neo-classical financial theory denies the existence of suitable financial intermediaries. Finally, Reißig-Thust (2003) considers the neo-institutional theory and mentions the importance of the principal-agent theory. She argues that difficulties before and after contract signing are best described and analysed by

the principal-agent theory. In that respect, she finally remarks that the configuration of the investment process is suitable to solve the risks of adverse selection and moral hazard.

According to Röper (2004), the so-called procedural-justice theory plays a significant role in the field of VC financing too. The theory is focused on the management of information flows and assumes that timely and accurate information creates positive relationships. Therefore, Röper (2004) points out that the theory is relevant to understand the issue of trust between investors and entrepreneurs. He argues that a positive and trustful relationship depends on a consistent information flow. As a result, a trustful relationship is able to reduce uncertainty and finally, monitoring costs.

With regard to the phenomenon of the PE market, Manchot (2010), inter alia, refers to the resource-based view. He argues that the resource-based view is suitable to reinforce the understanding of PE firms as suitable financial intermediaries. The resource-based view argues that the combination of particular tangible and intangible resources is resulting in competitive advantages. These advantages are resulting in above average returns. The resource-based view is, therefore, focused on the analysis of the individual competitive advantage due to specific resources. Manchot (2010) argues that PE investors provide both specific knowledge and financial resources to improve and to develop the business of the portfolio company. He examines the PE firm and the portfolio company as one unit which would be able to realise additional competitive advantages. However, Manchot (2010) qualifies these remarks and states that the competitive advantage depends on the degree of mutual supplement.

Overall, the initial review shows that the theoretical considerations in doctoral research moves in one direction and, basically, deny the suitability of the neo-classical theory. This applies both for the issue of PE and VC markets and for innovation and SME financing.

The subsequent section deals with the final deduction of the theoretical underpinning of the present examination.

3.3 Financial theory’s application in the present examination

Every reviewed researcher denies the applicability of the neo-classical financial theory in terms of describing PE, VC, SME and innovation financing. The researchers base their theoretical

underpinning on the assumptions of the neo-institutional financial theory. In some cases, as in the case of Röper (2004) and Manchot (2010), additional theories are considered. The present thesis is concerned with the PE and VC market in Germany during the post-crisis phase, with the investment process of PE and VC investors and public funding measures. In the context of that examination focus, the purposive sample is composed of PE and VC firms in the field of early-stage and smaller volume financing, CVC firms, public-owned investors and finally, the so-called Mittelständische Beteiligungsgesellschaften.

In terms of describing and explaining the PE and VC market, the application of the neo-classical financial theory is surely unsuitable. The assumptions of this theory are model theory and completely miss reality. In particular, the negation of transaction-costs, insolvency costs and taxes is completely unrealistic. If the overall assumptions of the neo-classical theory would be valid, financial intermediaries such as banks would be superfluous.

With respect to the degree of market's imperfectness on the level of SMEs, Niederöcker's (2001) assumptions are comprehensible. She refers to the degree of both information asymmetry and transaction-costs which are more pronounced on the level of SMEs than on bigger-sized enterprises. Furthermore, she points out that the valuation process on the level of SMEs is rather difficult for investors due to the lack of comparable data from the stock market. Therefore, SME valuation requires particular procedures in order to compensate for this information gap. In addition, SMEs are exposed to specific risks due to their focus on local markets, the smaller number of shareholders, customers and suppliers. Finally, risks occur due to owner's influence on the one hand and forecasting and accounting limitations on the other hand. These issues are clarified in greater detail in section 4.4.4. These particularities impede SMEs to be refinanced by banks and over the capital market. Niederöcker (2001), furthermore, concludes an increased level of information asymmetry in the field of innovation financing. Hence, the degree of information asymmetry and financing limitations in these areas are resulting in additional transaction-costs.

In that respect, the German PE and VC market not only shifted away from seed, start-up and expansion financing but also from smaller and middle-sized investments between 1999 and 2009 (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). This development strengthens the gap, in particular, in seed and start-up investments and thus the

degree of market's imperfectness. Moreover, market participants are partly public subsidised (see section 4.3) which is also a clear sign for the incompleteness of the capital market.

Furthermore, Hummel (2011a) points out that the economic risk of innovation directly influences the access to both equity and credit financing channels even though their number is increasing in relation to the progress of product development. Nevertheless, banks overall negate venture capital investments due to the:

- difficult assessment of risks and chances;
- missing company data and securities;
- complexity of transactions;
- uncertain exit options (Rudolph 2006).

Röper (2004) clarifies that banks possibilities for equity-financing are limited and, furthermore, mentions that banks are unable to assess innovations. In addition, he argues that the lack of guarantees and the increased default probabilities in the case of innovation financing would result in prohibitive financing conditions.

Obviously, banks are neither willing nor being able to close the gap in the demand of financing capital. This assessment should in particular apply for the period of the initial crisis phase. As pointed out in section 2.4, the bank sector's requirement of public support and its rebuilding, beside the introduction of Basel III, should result in future financing constraints. This applies in particular in the field of early-stage, SME and innovation financing. Therefore, the applicability of the neo-classical financial theory at this point must be denied in the field of SME and early-stage financing, and in the light of the financial crisis in particular.

3.3.1 Theory's application on private equity and venture capital markets

With regard to the present thesis, the neo-institutional theory is considered as the appropriate theoretical underpinning. As clarified in section 3.1.2, the neo-institutional financial theory is concerned with following perspectives:

- the principal-agent theory;
- the property-rights theory;

- the contract theory;
- the information asymmetry;
- the transaction-cost theory.

Initially, these perspectives are applied on the level of the PE and VC market. In that respect, the existence of PE and VC firms is best explained and described by the issues of information asymmetry and transaction-costs. Investments in the field of early-stage and SMEs are associated with particular investment risks. These risks arise due to different levels of information. In order to handle these risks, for instance in the field of SME and innovation financing, different types of investors apply different investment strategies. These strategies, for instance hands-on or hands-off (see section 4.4.6), are resulting in different amounts of transaction-costs. With regard to the German market, the public-owned investors and the Mittelständische Beteiligungsgesellschaften could be regarded as the strongest type of financial intermediaries. Even though not public-owned, the MBGs are operating as the so-called self-helping institutions to stabilise the equity basis of SMEs (see section 4.2). Therefore, they are not only focused on profit maximisation but also on closing financing gaps. This strategy is associated with larger investment proportions on the one hand (see table 17 in appendix D) and above-average loss proportions (see section 4.4.7) on the other hand. Hence, this investment strategy as self-helping institutions is associated with additional transaction-costs.

Nevertheless, neither banks nor the different types of PE investors are obviously willing to compensate every gap in SME and early-stage financing. In that respect, the proportions of seed, start-up and expansion financing, and also the proportions of both smaller and middle-sized investments were decreasing in Germany's PE and VC market between 1999 and 2009 (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). Even though investors have knowledge in several financing areas, they partly deny specific investments or claim for public support (see section 4.3 and table 14). If specific investments would not be subsidised, markets would fail due to the withdrawal of market participants or increased return expectations. Even though intensive in-depth screening could reduce the degree of information asymmetry in early-stage and SME financing, additional reviews would increase the transaction-costs. In that case, possible returns would neither compensate the specific investment risk on the one hand, nor the additional transaction-costs on the other hand.

In accordance with the present thesis, the issues of information asymmetry and transaction-costs are regarded as suitable in order to understand the existence of financial intermediaries in general, the existence of PE and VC markets in particular, and the issue of public funding measures.

The subsequent section is concerned with the application of the neo-institutional theory on the level of the investment process.

3.3.2 Theory's application regarding the investment process

On the basis of the neo-institutional theory, PE and VC firms are concerned with investment risks due to information asymmetries. As pointed out in section 3.1.3, the risks of adverse selection, moral hazard and hold up are caused by information asymmetries between investors and entrepreneurs. Explicit mechanisms of screening, contract negotiation, monitoring and mentoring, beside incentive measures are suitable to address the risks of information asymmetry. These explicit measures are associated with transaction-costs. Implicit mechanisms of trust and trust building measures are suitable to reduce the scope of the explicit mechanisms and thus transaction-costs (see section 3.1.3).

The present research programme is focused on the description of the explicit mechanisms along the investment process of PE and VC investors. On the basis of different investment approaches which are applied by business angels and venture capitalists, Engelmann and Heitzer (2001) conclude that the investment process is a suitable framework for successful investments in incomplete markets. They refer to the basic composition of the investment process and mention the phase of capital acquisition, deal flow, screening and selecting, negotiation, monitoring and mentoring, and the exit. The current examination is focused on the core investment process (see figure seven in appendix H) and is not concerned with the phases of capital acquisition and of investors repayment.

With regard to the present thesis, the transaction-cost theory is regarded as suitable to describe and to explain the process step of the deal flow. As pointed out in section 4.4.1, investors receive a large amount of business proposals. The handling of these proposals is associated with cost-intensive manpower. Therefore, the different deal sources support the process of deal acquisition

and are able to reduce transaction-costs. Nevertheless, the contribution margin depends on the particular deal source, which in some cases is associated with the payment of fees.

The principal-agent theory, the transaction-cost theory and the issue of information asymmetry are suitable to describe and to explain the process steps of the initial and the detailed screening. Due to different information levels between entrepreneurs and investors, this process step is necessary to reduce the risks of adverse selection, moral hazard and hold up. Depending on the extent of screening measures, transaction-costs vary and explain the difference in the scope of initial and detailed screenings.

Every perspective under the neo-institutional theory is regarded as suitable to describe and to explain the process of negotiation and contracting. Investors try to handle their investment risk by the negotiation of suitable contracts even though contracts could not be regarded as all-encompassing in order to qualify the risks of moral hazard and hold up. Therefore, depending on future developments, contracts require renegotiation which is associated with additional transaction-costs. In dependence on the results of the negotiation, possible contract structures differ and finally, influence the value of the investment (see sections 4.4.4 and 4.4.5).

The phase of monitoring and mentoring is best described and explained by the principal-agent theory, the property-rights theory, the transaction-cost theory and the issue of information asymmetry. In order to balance the information asymmetry between the principal and the agent, the investor requires information regarding portfolio company's development. The scope of monitoring and mentoring depends on the particular investment of the investor, the contract content and the performance of the portfolio company (see section 4.4.6). Both monitoring and mentoring are associated with different amounts of transaction-costs which depend on the respective investment strategy and the condition of the portfolio company.

Finally, the different exit channels could be best described and explained by both the transaction-cost and the property-rights theory. By choosing the appropriate exit channel, investors try to achieve maximum returns. IPOs are the most preferred exit route due to possible capital gains. Trade sales are less preferred and associated with smaller transaction costs. Property-rights on the other hand, could determine the final exit channel in advance. This is, inter alia, the case in terms of silent investments which require the repayment after the investment period (see section 4.4.7).

The subsequent table nine summarises the application of the particular theoretical perspective with regard to the PE and VC market, public funding and the investment process chain.

The theoretical framework of the present thesis						
Research area	Theories	Principal Agent	Property Rights	Contract theory	Information asymmetry	Transaction Cost
PE and VC market					X	X
Public funding					X	X
Deal flow						X
Deal screening		X			X	X
Negotiation/Contracting		X	X	X	X	X
Monitoring/Mentoring		X	X		X	X
Exit			X			X

Table 9 The theoretical framework of the present thesis (own development)

3.4 Chapter summary

The research subjects of the present examination could be examined and described out of several theoretical perspectives. The earlier financial orientation is production flow oriented. The subsequent periods of industrialisation were then focused on the optimisation of production and financing processes. The latest financial orientation is associated with both the neo-classical and the neo-institutional theory (see section 3.1). The neo-classical theory is based on the assumption of perfect and complete capital markets which would ensure every type of financing (see section 3.1.1). The neo-institutional theory on the other hand negates the existence of complete and perfect capital markets. In accordance with the neo-institutional theory, difficulties in the market are caused by information asymmetries between market participants. These asymmetries are associated with the risk of adverse selection, moral hazard and hold up. In order to handle investment risks, every institutional framework is associated with transaction-costs. Therefore, the neo-institutional theory is focused on the examination of institutional frameworks regarding their suitability to reduce information risks and transaction-costs (see section 3.1.2).

The neo-classical theory is unsuitable to describe PE and VC markets in general and venture capital markets in particular. Both markets emerged due to capital markets' incompleteness and imperfectness. Therefore, the present thesis considers the neo-institutional theory as the suitable framework to describe the PE and VC market, the investment process and public funding measures. The MBGs and public-owned investor are regarded as the strongest form of financial intermediaries. Both the public investors and the MBGs are concerned with closing market gaps due to their status as self-helping institutions. Nevertheless, PE and VC firms obviously do not compensate every financing gap even though the market benefits from a large proportion of public funding (see section 4.3).

Hence, the present thesis is based on a neo-institutional perspective in order to understand the developments of the PE and VC market, the changes along the investment process and the application of public funding.

Chapter 4 Private equity markets in the light of the financial crisis

Initially, this chapter describes the progress of the PE and VC market out of a European and a German perspective. This part of the chapter is finalised by the detailed description of both long-term developments and particularities in Germany's PE and VC market. In addition, the chapter is concerned with the description and explanation of each phase step along the investment process of PE and VC investors. This is required in order to understand the sequence of events and to receive an overview regarding the variables within each process step. Finally, the chapter is concerned with the progress of public funding measures on the federal level. These subjects, namely the PE and VC market, the investment process and public funding are regarded from a neo-institutional perspective. The second part of the chapter then summarises the main literature review outcomes, specifies the literature gap and derives a basic theory. The whole chapter is finalised by the introduction of the research aim and objectives.

4.1 The development of the private equity market in Europe and Germany

This section initially compares the developments of the entire PE and VC market in Europe with the developments in Germany during the initial and the post-crisis phase. These developments and market proportions are, furthermore, detailed in a country related perspective. Finally, this section presents particularities of Germany's equity market and market members' concerns regarding current developments.

The European private equity and venture capital market developed successfully in the run up of the financial crisis due to:

- low interest rates;
- increasing stock market values;
- banks' and investors' readiness to provide investment capital.

At the forefront of this development, valuation multiples, debt/earning ratios and large debt financed transactions increased significantly (Corsetti 2009). In the subsequent phase of the financial crisis, the amount of new funds dropped significantly from approx. 79.6 billion euros in 2007 to approx. 23.6 billion euros in 2012. The amount of total investments of approx. 69.8 billion euros in 2007 declined to approx. 36.5 billion euros in 2012, even though interrupted for a

short period of recovery both in 2010 and 2011. Divestments decreased from approx. 26.5 billion euros in 2007 to 14 billion euros in 2008 and were then followed by a significant recovery in 2011 in the amount of approx. 30.3 billion euros. Divestments finally declined in 2012, and resulted in the amount of approx. 21.6 billion euros. The proportion of total losses from total divestments increased from approx. 2.7% in 2007 to 35.2% in 2009, and finally decreased to 8.7% in 2012. The amount of VC investments approx. halved between 2007 and 2012 (EVCA 2013). A detailed overview regarding the development of the market in Europe is presented in table ten (see appendix G.1).

In Germany, the amount of raised funds dropped by 59% from approx. 4.5 billion euros in 2007 to approx. 1.9 billion euros in 2012. This decrease was interrupted by a significant increase by 172% from 1.2 billion euros in 2010 to 3.3 billion euros in 2011 (EVCA 2013). Hence, Germany's PE market developed in relation to the substantial economic recovery in 2010, which was associated with GDP's increase by 4.2% (Destatis 2013). Total investments in the PE and VC market dropped by 38% from approx. 10.5 billion euros in 2007 to 6.5 billion euros in 2012. Divestments dropped significantly from approx. four billion euros in 2007 to 1.9 billion euros in 2009. The amount of divestments increased significantly in 2010 and 2011, but finally declined again and resulted in 3.4 billion euros in 2012. The proportion of total losses from total divestments increased from 3.3% in 2007 to remarkable 46.1% in 2009, and finally declined to 12.5% in 2012. With regard to venture capital investments, their amount declined from approx. 817 million euros in 2007 to approx. 549 million euros in 2012 (EVCA 2013). A detailed overview regarding the market's development in Germany is presented in table 11 (see appendix G.2).

With regard to a country related perspective, data show that the German PE and VC market is comparatively small (see also section 2.6.3). This applies for the entire PE and VC market on the one hand but also for the venture capital market in a separated perspective on the other hand. In that respect, data show that the UK's PE and VC market was at least and round about twice as big as the German PE and VC market between 2007 and 2012. This difference is getting clearer in comparison to the national gross domestic products. Even though Germany's GDP outweighs the GDPs from the UK and France, the proportion of Germany's PE and VC investments from the national GDP is comparatively small. This is not only the case on the level of the entire equity investments but also, more detailed, on the level of the venture capital investments too (see subsequent tables 12 and 13).

The private equity and venture capital markets in Europe			
Country	PE/VC investments in BEUR[1)]	VC investments in MEUR[1)]	Proportion of VC
Year 2007			
United Kingdom	20.03	1,502	7.5%
France	12.15	1,025	8.4%
Germany	10.45	817	7.8%
Year 2010			
United Kingdom	12.72	771	6.1%
France	6.65	751	11.3%
Germany	4.90	729	14.9%
Year 2012			
United Kingdom	10.03	658	6.6%
France	5.28	566	10.7%
Germany	6.63	567	8.6%

1) Market statistics (including the investments of investors from outside Europe).

Table 12 The private equity and venture capital markets in Europe (derived from InvestEurope 2016)

The private equity and venture capital proportions from national GDPs			
Country	GDP in BEUR	Proportion of PE/VC investments[1)]	Proportion of VC investments[1)]
Year 2007			
United Kingdom	2,167	0.92%	0.069%
France	1,946	0.62%	0.053%
Germany	2,513	0.42%	0.033%
Year 2010			
United Kingdom	1,812	0.70%	0.043%
France	1,998	0.33%	0.038%
Germany	2,580	0.19%	0.028%
Year 2012			
United Kingdom	2,055	0.47%	0.032%
France	2,087	0.25%	0.027%
Germany	2,755	0.24%	0.021%

1) Market statistics (including the investments of investors from outside Europe).

Table 13 The private equity and venture capital proportions from national GDPs (derived from InvestEurope 2016)

Beside these long-term and country related developments, the German PE and VC market was described from an additional particularity and, moreover, was concerned with several subjects which dominated the market internal debate. These issues are presented in the subsequent section.

4.2 Germany's private equity and venture capital market

Germany's private equity market is organised in the German Private Equity and Venture Capital Association e. V. (BVK) in Berlin. At the end of 2012, the association represented 187 private equity and venture capital firms. In addition, estimations show that further 40 to 50 PE and VC firms were operating outside a BVK membership (BVK 2013b). A particular type of PE firm in Germany is represented by the so-called Mittelständische Beteiligungsgesellschaften. In total, 15 MBGs are operating in Germany and each MBG is located in one federal state of Germany. Berlin and Brandenburg are represented by one MBG. These investors are focused on the stabilisation of SMEs equity basis rather than on the maximisation of their own profits. The MBGs are refinanced by the accumulation of capital gains and by public loans. In addition, the MBGs receive public guarantees for parts of their investments. Shareholders are banks, chambers of commerce and economic federations in the federal state of the respective MBG. Their investment amount per deal is comparatively small and varies between 0.1 and 2.5 million euros (Henrich and Selbherr 2009). Even though the MBGs differ from the overall PE and VC market due to their particular business purpose as self-helping institutions, they are full members of the BVK. As well as the entire market, the MBGs could not escape from financial crisis' impacts either. Their total investment volume dropped from approx. 176 million euros in 2007 to approx. 138 million euros in 2009 followed by a slight recovery to reach 142 million euros in 2010 (BVK 2011b). Their loss proportions are comparatively large and resulted in approx. 38% for 2008 (BVK 2009a), approx. 53% in 2009 (BVK 2010b), and approx. 40% in 2010 (BVK 2011b). During the initial phase of the financial crisis, their investments varied between 100,000 and 500,000 euros per deal. During this timeframe, approx. 75% of the MBGs expected investment returns up to 10% and in their majority invested as sole investors (Achleitner et al. 2010). In 2010, MBGs were most active in Baden-Wurttemberg, Bavaria and Schleswig-Holstein (BVK 2011b). Due to liquidity constraints of SMEs in Germany, the MBGs extended their business operations, launched additional funds and intensified the cooperation with banks. Overall, the core competence of the MBGs is the financing of smaller enterprises by mezzanine investments (Selbherr and Steffen 2010).

During the examination timeframe, a major concern in the German private equity market was associated with the so-called AIFM-directive which was adopted by the European parliament in 2010. This directive set standards for minimum capital requirements, and for valuation and reporting standards for fund managers of alternative investments. This legal framework was implemented as a consequence of the financial crisis in order to regulate and to supervise investment funds outside the bank and the insurance sector (BVK 2011a). The AIFM-directive had to be transformed into a national law until July 2013 and therefore was discussed in every working group of the BVK (BVK 2012a). An additional concern in Germany's PE and VC market was associated with a VC law that was adopted to improve the financing conditions for start-ups. This law, which was adopted in 2008, was stopped by the European Commission due to competitive concerns (BVK 2011a).

4.3 Research on Germany's private equity market

This section describes the long-term developments in Germany's PE and VC market and is based on research results from Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). These cross-sectional research projects are each based on BVK memberships at research moment and achieved remarkable response rates of approx. 50% each. Hence, these examinations deliver a comprehensive overview regarding the changes in the German PE and VC market since the millennium turn.

Zimmermann and Fischer (2003) are focused on market's development in Germany between 1999 and 2001. During this period, Germany's GDP increased by 1.9% in 1999, by 3.1% in 2000, and by 1.5% in 2001. Compared to GDP's average development between 1960 and 2012 by 2.4% (Destatis 2013), the average increase of 2.2% during this research timeframe of 1999 to 2001 could be regarded as a normal economic development. According to research findings from Zimmermann and Fischer (2003), the majority of investments were realised for seed and start-up financing with a market share of approx. 43% followed from expansion financing with a proportion of 38%. Moreover, the majority of deals were realised in the industry, the IT, the telecommunication, the media and the life science sector. Approx. 35% of the investments were smaller than 750,000 euros and 53% of the investments were smaller than 1.5 million euros per deal. Medium-sized investments between 1.5 and five million euros per deal resulted in a proportion of approx. 31% (Zimmermann and Fischer 2003). According to their research results, Zimmermann and Fischer (2003) argue that the German PE and VC market would be in an early

step of development due to a large number of support-oriented investors and a weak specialisation in the entire market. By dividing the market structure in support and profit-oriented investors, Zimmermann and Fischer (2003), moreover, mention that the support-oriented investors would be rather concerned with smaller investments in the later stages of enterprises' life cycle. In addition, support-oriented investors would also realise a larger investment proportion in relation to investment requests. Profit-oriented investors on the other hand would be focused on larger buy-out transactions or on early-stage investments. Their investment proportion in relation to investment requests is smaller, whereas their return expectations are larger in comparison to the support-oriented investors. With regard to potential market gaps, survey respondents indicated gaps in the financing of early-stage but also in the financing of turnaround investments. Moreover, the survey respondents indicated that the market would suffer from financing gaps in smaller volume investments up to 750 TEUR per deal. This assessment of the respondents regarding the financing gap in early-stage investments might be a consequence of the disproportionately successful development of the so-called Neue Markt, the technology stock market segment in Germany, which was associated with a bulk of both investment and divestment possibilities. Due to the significantly larger number of investment requests for early-stage investments, market members obviously have seen demand for additional early-stage financing resources.

Achleitner et al. (2006) examined the subsequent period between 2002 and 2004. This period was associated with GDP's average increase by 0.3% (Destatis 2013). According to Achleitner's et al. (2006) research findings, investments for seed and start-up financing resulted in a market share of approx. 34%. This is a significant decrease in comparison to the initial research results of Zimmermann and Fischer (2003) who calculated a proportion of 43% in that respect. Expansion financing on the other hand slightly increased up to a share of 39%. The industry, the IT, the telecommunication, the media and the life science sector were still the most preferred investment areas. Achleitner et al. (2006), furthermore, point out that approx. 45% of the investments were smaller than 750,000 euros and 59% of the investments were smaller than 1.5 million euros per deal. This is a significant increase in comparison to the earlier research in both values. On the other hand, the proportion of medium-sized investments between 1.5 and five million euros per deal decreased significantly and resulted in a proportion of approx. 21% (Achleitner et al. 2006). In the context of these research results, Achleitner et al. (2006) argue that the PE and VC market has shifted away from early-stage into later-stage investments as a consequence of the new market breakdown. This change was associated with increasing deal

sizes on the level of later-stage investments and increasing turnover requirements regarding the target firms. This underlines the assumption that the PE and VC market avoids investments in early lifecycles of enterprises during unstable economic developments. Interestingly enough, this reorientation also resulted in an increase of smaller investment amounts, obviously as an attempt of risk diversification. Achleitner et al. (2006), moreover, conclude a specialisation trend in the market to achieve competitive advantages and distinguish between more experienced and bigger-sized investors on the one hand and smaller and less experienced early-stage investors on the other hand. In that context, they argue that approx. one third of the market participants meanwhile would have at least ten years of investment experience. This increasing market maturity would also be underlined by an increasing market competition as a significant proportion of deals were finally realised by a competitor. This assumption would apply at least for the later-stage investors so that the consolidation process on the level of the early-stage investors would not have been finalised (Achleitner et al. 2006). As in the initial study of Zimmermann and Fischer (2003), the survey respondents indicated that the market would still suffer from financing gaps in early-stage investments. Moreover, survey respondents still indicated a financing gap of smaller investments up to 750 TEUR per deal.

Achleitner's et al. (2010) latest research is focused on the development of the PE and VC market in the initial phase of the financial crisis between 2007 and 2009. During this timeframe, Germany's GDP decreased on average by 0.2% due to the significant decline of 5.1% in 2009 (Destatis 2013). During the research timeframe, the proportion of early-stage investments in the field of seed and start-up financing and the proportion of expansion financing resulted in 31% (Achleitner et al. 2010). On the other hand, the proportion of management-buy-outs and management-buy-ins more than doubled in their market share from 13% in the initial research (Zimmermann and Fischer 2003) to 27% in the initial phase of the crisis (Achleitner et al. 2010). The market was still dominated from later-stage investors with a decline in the proportion of universal PE and VC firms. The IT, the telco, the media and life science, and the industry sector were still the dominating industry branches. At research moment in 2010, approx. 56% of the survey participants expected minimum investment returns of at least 20%, which is a decrease in comparison to the initial study of Zimmermann and Fischer (2003) but a significant increase in comparison to the study of Achleitner et al. (2006). In that respect, 61% of the respondents in the initial study expected minimum returns of at least 20% (Zimmermann and Fischer 2003) in comparison to 49% of the survey respondents in the study of Achleitner et al. (2006). Even though a more detailed comparison analysis should be regarded with care due to different

investment return classes in the final study of Achleitner et al. (2010), the entire results support the careful assumption that there seemed to be a significant decrease in the proportion of PE and VC firms which expected minimum returns of at least 28% and 30% respectively between 1999 and 2009 (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). Moreover, the results showed that approx. 46% of the investments were smaller than 1.5 million euros per deal (Achleitner et al. 2010), which stands for a significant decline in comparison to the earlier research results (Zimmermann and Fischer 2003; Achleitner et al. 2006). The proportion of medium-sized investments between 1.5 and five million euros per deal remained quite stable and resulted in approx. 20% (Achleitner et al. 2010). On the other hand, investments above 50 million euros per deal increased in their market share from approx. 5% in the initial research phase (Zimmermann and Fischer 2003) to 14% in the initial phase of the financial crisis (Achleitner et al. 2010). In that context, Achleitner et al. (2010) conclude that the trend of professionalisation was still proceeding as further universal investors would have followed the path of later-stage investments. This development was accompanied with increasing fund volumes and hence a declining number of smaller investment funds in the market. According to the assessments of the survey respondents, the market suffered from investment gaps in start-up, expansion and turnaround financing. The financial crisis in particular not only caused a significant increase of total losses but also an increasing mentoring effort in the market. In addition, research results from Achleitner et al. (2010) show that approx. one third of the deals were not realised as contract parties were not able to agree on specific contract rights. In that respect, they conclude that as a consequence of the financial crisis, investors obviously had difficulties to agree on important contract clauses.

Regarding investor's specific financing focus, which is derived from the proportion on the total financing volume, the examinations of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010) show following developments. The corporate venture capital firms and the independent PE and VC firms and thus the group of profit-oriented and more strategic investors, were focused on expansion financing, start-up financing and on MBO and MBI investments between 1999 and 2009. The more detailed view shows that within this group, the proportion of start-up financing decreased significantly, while the proportion of MBO and MBI investments approx. doubled between 1999 and 2009. The public and the semi-public investors were focused on expansion and on start-up financing too. Their proportion of MBO and MBI financing decreased, while their proportion of seed financing increased significantly between 1999 and 2009. Interestingly enough, this group of investors provided turnaround financing at

least between 1999 until 2001, but since then were virtually not involved in restructuring related investments. The so-called Mittelständische Beteiligungsgesellschaften also focused on expansion financing but with a two times bigger proportion in comparison to the entire market. Between 1999 and 2009, the MBGs not only increased their MBO and MBI investments but reduced their start-up financing significantly and, moreover, left the path of seed financing quite completely (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010).

In order to close market gaps and to settle market inefficiencies in the PE and VC market, different types of public support measures are provided from different public institutions. Public support is provided on the federal states level, on the federal level and on the level of the European Union. Public support is realised by direct co-investments in the portfolio company, by co-investments in the investment fund or by refinancing the specific investment (Achleitner et al. 2010). The subsequent table 14 shows that between 1999 and 2009, public funding overall played an important role in Germany's PE and VC market. The statistics show that approx. one quarter of early-stage investors' investment volume was publicly supported, whereas this proportion was comparatively smaller on the level of the later-stage investments. This is surely a sign of the significantly larger investment risk on the level of early-stage financing. Research results in that context also show that programmes which were issued by the Kreditanstalt für Wiederaufbau were most often considered and that programmes from the EU only played a secondary role (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010).

The public funding proportions in Germany's equity market			
Proportion/Timeframe	1999 – 2001	2002 – 2004	2007 – 2009
Proportion of investors who applied			
for any type of public support	72%	63%	36%
(without public investors)			
Public funding proportion from investment amounts:			
Early-stage investments	28%	24%	27%
Later-stage investments	10%	5%	14%
Most important public funding provider	KfW	KfW	KfW

Table 14 The public funding proportions in Germany's equity market
(derived from Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010)

In addition, the studies of Achleitner et al. (2006) and Achleitner et al. (2010) show that PE and VC investors syndicated their investments. In that respect, research results show that the syndication proportion of the early-stage investors was significantly larger in comparison to later-stage investors' syndication proportion as well as the syndication proportion of the profit-oriented and the more strategic investors in comparison to the public and the semi-public investors. In comparison to the entire market, the MBGs realised the smallest syndication proportion each in 2005 and 2010 (Achleitner et al. 2006; Achleitner et al. 2010). The syndication behaviour of the market participants is presented in the subsequent table 15 and the entire market developments between 1999 and 2009 are summarised in table 16 (see appendix G.3).

The syndication proportion in the German PE and VC market						
Syndication proportion in 2005						
Type of investor	Total market	Early-stage	Later-stage	Independent/ CVC	Public/ semi-public	MBGs
Not syndicated	37%	16%	52%	32%	48%	68%
Syndicated	63%	84%	48%	68%	52%	32%
Total	100%	100%	100%	100%	100%	100%
Syndication proportion in 2010						
Not syndicated	46%	22%	62%	41%	50%	72%
Syndicated	54%	78%	38%	59%	50%	28%
Total	100%	100%	100%	100%	100%	100%

Table 15 The syndication proportion in the German PE and VC market
(derived from Achleitner et al. 2006; Achleitner et al. 2010)

Beside these market related developments, the subsequent sections are concerned with equity investors' investment process. At first, the subsequent section describes the composition of an investment process. The further sections are then concerned with the detailed description of each process step.

4.4 The literature regarding private equity firm’s investment process

The investment process is the institutional framework of PE and VC firms to arrange and to handle their investments. Even though the configuration of the process might differ due to the particular type of investor (Engelmann and Heitzer 2001), the basic composition of the process chain could be divided into five different phases. The so-called deal flow introduces the process

chain and refers to the acquisition of projects. The second phase is associated with the analysis of investment proposals. After positive evaluations, the subsequent phase refers to the negotiation of contracts. In the case of successful negotiations, the phase of monitoring describes the supervision of the investment during the investment period. After a limited period, the investment is sold during the exit phase (Feldmann et al. 2007). In terms of a deeper understanding, several types of investment process clarifications are subsequently introduced.

Nathusius (2001) distinguishes eight different process steps. According to his clarifications, the initial step of deal sourcing is followed by the process of deal screening. This deal screening is further divided into a rough analysis of business proposals and a detailed due diligence. Depending on audit results, the subsequent phase is focused on composing an investment proposal for the investment committee of the PE or VC firm. The investment proposal is discussed by the investment committee and the investment is realised after successful negotiations. The following phases refer to controlling and mentoring on the one hand and the final divestment on the other hand. Matz (2002) refers to eight distinct process steps too but initially considers the foundation of the PE firm and the acquisition of investment capital. Subsequently, he introduces the core process chain and refers to the acquisition, the screening and the valuation of deals, the negotiation of contracts, the monitoring and the mentoring, and the divestment phase. This core investment process is followed by the reinvestment of capital gains or investors' repayment. On the contrary, Tyebjee and Bruno (1984) detail the process chain into five sequential steps. They refer to deal origination, deal screening, evaluation of business proposals, deal structuring for negotiation purposes and post investment activities. The latter activities are concerned with controlling, mentoring and investor’s exit. An investment process is enclosed in appendix H.

The average duration from the initial contact to the final investment decision ranges between three and six months (Nathusius 2001; Thum et al. 2008; Hummel 2011b). Hummel (2011b) in that respect points out that the proportion of PE and VC firms which require more than six month for the investment decision, decreased from approx. 16% in 2004 to 6% in 2007. In addition, both the minimum and the maximum investment durations declined. Until 2001, investment durations varied between 16 and 204 months, in comparison to seven and 169 months in 2011. The total investment duration of PE investors in Germany on average is 4.8 years according to a long-term analysis between 1986 and 2011. During the initial phase of the crisis between 2007 and 2009, the average investment period increased significantly due the declining number of

exits until 2009 (BVK 2012b). These developments could be regarded as an indicator for the professionalisation of the overall market in Germany due to an increasing competition.

The present research is focused on the so-called key investment process and thus on the deal flow, the deal screening, the negotiation of contracts, the monitoring and mentoring of investments, and investor's exit. In that respect, the literature base does not distinguish between different types of investment process chain configurations depending on the type of equity investor. The subsequent sections are focused on the different chain steps in order to clarify their basic configuration. This procedure is also required to determine the variables for the questionnaire along the investment process.

4.4.1 The literature regarding the deal flow

According to research results from Zimmermann and Fischer (2003), investors received on average approx. 490 investment proposals in 2011. This amount decreased to 268 proposals in 2004 (Achleitner et al. 2006) and approx. 220 proposals in 2009 (Achleitner et al. 2010). PE investors' network, banks and direct inquiries were the most important deal sources between 2002 and 2004 (Achleitner et al. 2006). Private equity firms network was still the most important source in the initial phase of the financial crisis, followed by direct requests and banks (Achleitner et al. 2010). Interestingly enough, business plan competitions and syndications are of minor importance in the examinations of 2004, 2007 and 2009 (Achleitner et al. 2006; Achleitner et al. 2010). Between 2001 and 2009, the majority of business proposals were addressed to early-stage investors, which is surely a sign of the ongoing demand for venture capital in Germany (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010).

This progress in the amount of investment requests reflects the development of the PE and VC market in Germany since the millennium turn. Between 2000 and 2003, the PE and VC market in Germany decreased significantly which is shown by the decrease of investments on the one hand and the number of PE and VC firms on the other hand (Achleitner et al. 2006). Germany's GDP on the other hand decreased from an increase of 3.1% in 2000 to a decline by 0.4% in 2003. This development was followed from increases by 1.2% in 2004 and by 3.7% in 2006 (Destatis 2013). The bulk of business proposals in 2001 surely has been a consequence of the extraordinary development of Germany's PE and VC market, rather than a consequence of

economic circumstances. The awareness regarding the potential of internet-based business models, the introduction of the euro and the millennium turn caused a bulk of potential business proposals. Start-up ideas have been quite easily absorbed by investors due to the positive development of the PE and VC market on the one hand and stock market's positive trend on the other hand. This enabled investors to rather easily selling their portfolio companies both quickly and successfully over the capital market. As one investor in the research from Kollmann and Kuckertz (2004, p. 20) states: "The idea has to have a valuable technological nucleus, which is understandable, fixes a concrete problem and opens up business opportunities". This supports the assumption that the market, due to the technological orientation, was simply overloaded from more or less communicable investment ideas.

The business proposals go through the process of deal screening which is clarified in the subsequent section.

4.4.2 The literature regarding the deal screening

Equity investors in Germany received approx. 490 business proposals in 2001 (Zimmermann and Fischer 2003), approx. 268 proposals in 2004 (Achleitner et al. 2006) and approx. 220 proposals during the initial phase of the financial crisis (Achleitner et al. 2010). Early-stage investors are far above these average amounts and received approx. 550 proposals in 2001, 324 proposals in 2004 and 335 proposals per year during the initial phase of the financial crisis (Achleitner et al. 2010). Due to the overall large number of investment proposals, the initial evaluation of business plans is a time-limited process. Approx. 20% of the respondents in the research study of Reißig-Thust (2003) reported an initial screening period between ten and 20 minutes per business plan, whereas approx. 13% of the respondents reported a period between 20 and 30 minutes. Finally, 53% of the respondents reported an initial screening period of 30 minutes. These screening durations are rather small in relation to the content of a standard business plan. In the normal case a business plan contains an executive summary and more detailed sections regarding research and development, procurement and production, market and product, marketing and sales, management team, organisation, patents and proprietary rights. Finally, a business plan contains a financial statement and a forecast (Stahl 2003).

The literature review shows that different types of investors have different weightings regarding the importance of each review field. Vater (2002) was research active regarding the initial and

the detailed screening of equity investors in Germany. According to his research results, the financial forecast, the management team, the product and the market, and past financial statements are regarded as the most important review fields during the initial screening. These results apply for the entire market but the more detailed interpretation shows that venture capital investors are also focused on exit possibilities. Interestingly enough, this issue is regarded as the most important point in the initial screening of venture capital investors (Vater 2002). Tyebjee and Bruno (1984), in earlier times research active regarding VCs investment focus, mention that the majority of their sample members simply check the size of the investment, the market and the technology, the financing stage and, in some minor cases, also the geographic location. Overall, the further review of the literature base leads to the assumption that investors are clearly focused on product's differentiation, market's attractiveness and the cash potential of their investment (Tyebjee and Bruno 1984; Brettel 2002; Kollmann and Kuckertz 2004). In addition, the literature base shows that the management team is surely one of the most important issues in the investment decision process of investors (Tyebjee and Bruno 1984; Brettel 2002; Vater 2002; Kollmann and Kuckertz 2004; Mason and Stark 2004). In that respect, Franke et al. (2004) detail the management team criteria in the initial screening phase and refer to:

- the importance of market knowledge;
- the type and level of team qualification;
- the team coherence and earlier human resource responsibilities.

Brettel (2002) with regard to the German VC market mentions the relevance of market knowledge too, but, furthermore, refers to team spirit, risk orientation, resilience and integrity as important decision factors too. Moreover, the management team should have different skills in different areas which must be complementary in the respective team (Brettel 2002; Kollmann and Kuckertz 2004). Beside these rather similar assessments of management team's importance, Petty and Gruber (2011), interestingly enough, argue that the management team is not as important as overall indicated. They mention that there is still the possibility of replacement prior or during the investment period in a majority of cases. This conclusion is based on the analysis of 3,631 deal proposals and finally 35 investments during a period of 11 years. This interesting research study, even though limited to one European-based venture capital firm, moreover, sees influences in the decision making due to economic circumstances. Petty and Gruber (2011) clarify that economic upturns are associated both with an increase of funds volume and an increasing number of incoming business proposals. This situation results in an increasing number

of proposal rejections on the one hand and an increase in the relevance of product and service related issues on the other hand. With regard to such economical influences, Kollmann and Kuckertz (2004) analysed changes in the decision making process during the millennium turn. Even though their research findings are based on a purposive selection of ten technological oriented VC firms in Germany, Austria and Switzerland, their research results disclose changes in the initial screening process. They argue that investors are focused on such products which are able to realise sufficient returns in different markets. Thus, innovative products which are limited on market niches are not considered for investments as a consequence of the economic decline during the millennium turn.

At the end of the initial screening, approx. 80% of the proposals are rejected (Nathusius 2001; Franke et al. 2004). In Germany, approx. 20% of the proposals in 2001, approx. 16% in 2004, and approx. 21% per year during the initial phase of the financial crisis were considered for a detailed analysis (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). That means that the proportion of due diligences between 2001, and the initial phase of the financial crisis more than halved in relation to the decreasing number of business proposals. The due diligence proportions also vary according to the specific type of investor. Results for the initial phase of the crisis show that early-stage investors considered approx. 15% of the incoming proposals for a detailed analysis, whereas the MBGs considered approx. 55% (Achleitner et al. 2010). These results for the MBGs are also far above in comparison to the average proportion of 21% (Achleitner et al. 2010) in the entire market. The ratio of the MBGs in that respect should be interpreted with care as the MBGs prefer silent investments on the one hand and are investing in comparatively smaller investment amounts on the other hand. It should not be concluded that their due diligence procedures are comparable to these of the remaining market members.

4.4.3 The literature regarding the detailed analysis

The detailed analysis, the so-called due diligence (Nathusius 2001), is carried out in order to balance information asymmetries between investors and entrepreneurs. Beside the economic importance of the due diligence, information is also required to structure the contract and for investor’s guarantee rights. Even though investors in Germany are not legally obliged, the implementation of a due diligence is recommended due to warranty principles (Berens et al. 2002).

The research results from Reißig-Thust (2003) show that approx. 67% of the venture capital firms in her sample require more than three man-days, approx. 14% between two and three man-days, and approx. 5% one man-day for the detailed analysis. During these periods, the investors according to Natusch (2002) are focused on following review fields:

- human resources;
- product market;
- technology;
- finance;
- tax and legal;
- organisation and IT.

Human characteristics and capabilities are also reviewed by the so-called psychological due diligence which summarises the issues of both HR and cultural aspects. Even though it is somewhat difficult to quantify soft facts directly, they indirectly influence the financial results of an enterprise (Koch 2011). With regard to financial crisis related effects, Frohn and Arvizu (2012) mention an increasing importance of firm's operations. They remark that due to market's instability, additional in-depth information is required for an investment decision. Frohn and Arvizu (2012) refer to shortcomings in the traditional due diligence process and criticise its narrow perspective. Therefore, the so-called operational due diligence is focused on the analysis of processes, core competences, the identification of risks, synergies and additional value drivers. A final objective of the ODD is the validation of the basic due diligence results and the determination of improvement measures for the investment period.

Since start-up companies in the normal case have no or only limited production resources or organisational structures, due diligences on the level of start-ups are different in comparison to established enterprises. Beside the issues of the management, the product and the technology, the customer base and the market, this type of due diligence is, moreover, concerned with detailed reviews regarding calculations and estimations behind the business model. This means that the business idea must be scalable in order to assess the growth perspective (Brandis and Kawohl 2003).

Nevertheless, Vater (2002), according to his research findings for venture capital firms in Germany, refers to the management team as the most important review area during the detailed

analysis. Further important review fields are the product and the market, exit possibilities, future cash-flows and the issue of research and development. Röper (2004), who was research active regarding CVCs in the US, Germany and Switzerland, agrees with the research results from Vater (2002) regarding the importance of the management team. In that respect, Röper (2004) underlines the relevance of management team's strategic orientation, product and market knowledge, and finally, management team's qualification. Achleitner et al. (2006), according to their research results for the German PE and VC market, mention that the management team, the financial forecast, and the product and service related issues are the most important review fields. Thus far, they agree with the research results from Vater (2002) and Röper (2004).

Even though the importance of review fields differ due to the specific research focus, it could be concluded that equity investors in general are focused on the product, the market and the financial aspects. In addition, the literature base shows that the management team, its qualification and personality is both very important in the initial and the detailed analysis process.

The results of the due diligence regarding financial aspects and the product market could be directly considered for firm valuation purposes, both in the earnings value and the discounted cash-flow method. In the case that the firm value is based on the multipliers method, the results of the due diligence are considered for surcharges or reductions to adjust the results of the valuation (Natusch 2002). As the literature regarding the due diligence was reviewed in the context of firm valuation procedures, the subsequent section briefly summarises the main findings regarding the development of firm valuation.

4.4.4 The financial crisis and enterprise valuation in Germany

Enterprise values are dependent on different parameters and objectives, which applies in particular in the case of SMEs. A rough orientation distinguishes between monetary objectives, which refer to enterprise's capability in generating profits, strategic objectives and finally, meta-economic objectives. The latter are focused on the issues of power, independence and safety, each on the level of enterprise owners and investors. It is rather difficult for investors to assess and to quantify these particular aspects on the level of the entrepreneur. Nevertheless, meta-economic aspects could not be disregarded as they influence the enterprise value too (Behringer

2009). In addition, SMEs are associated with following particularities which influence the enterprise value both positively and negatively:

- the flexibility of the company structure;
- the number of shareholders, customers and suppliers;
- the influence of the enterprise owner;
- the limited capital market access;
- the lack of strategic plans;
- the limitation in accounting;
- the risk of expertise loss;
- a local market focus.

Therefore, a preceding firm analysis on the level of SMEs is concerned with restructuring levers, firm's financial structure and the separation of non-operating from operating assets (Helbling 2002a).

Irrespective of this integrated valuation process, PE and VC firms in Germany apply standard valuation procedures. According to Hoffelner's (2010) research results, the multipliers, the discounted cash-flow and the earnings value method are the most popular methods of company valuation in Germany. PE firms have neither changed their practices nor intend to do so due to financial crisis related impacts. This is despite the fact that the crisis could have affected single determinants in the valuation process and, finally, the company value (Zwirner and Reinholdt 2009b).

According to Zwirner and Reinholdt (2009a), impacts on the level of the earnings value method and the discounted cash-flow method could be realised on the level of the base rate, the market risk premium and the beta-factor.

In order to determine the beta-factors, the development of the target firm is compared with the development of a reference group. Therefore, the correlation between the entire stock market and sector related stocks is calculated (Jonas 2009). Depending on these results, industry branch related beta-factors increase or decrease and finally influence the enterprise values. Zwirner and Reinholdt (2009b) initially assumed that beta-factors vary more intensively due to crisis' impacts as they did before. Due to crisis' effects, sector-specific beta-factors were substantially

influenced and lead to different valuation results. For example, the beta-factors in the financial sector increased significantly due to the decline of the stock market on the one hand and the decrease of bank stocks on the other hand. On the contrary, beta-factors in the telecommunication sector decreased even though telecommunication stocks remained stable. Improved business models or strategies could have had a positive effect, as in the case of the bank sector, but are unconsidered due to beta-factors which are based on historical data (Jonas 2009). Therefore, it seems reasonable to adjust these factors accordingly by separate calculations (Zwirner and Reinholdt 2009a) or by ignoring significant influence parameters from the past (Jonas 2009).

The terminal value reflects the assumption of future developments and inflation, and could also be negatively affected by the crisis' impacts (Zwirner and Reinholdt 2009a).

Enterprise values in 2007 compared to 2011 would have increased substantially if base rates would have decreased under the assumptions of equal risk premiums, beta-factors and company earnings. This positive development in enterprise values is explained by the decrease of equity costs in the capital-asset-pricing-model. The increase of enterprise values in this timeframe could not be confirmed by stock market based multipliers. On the contrary, if calculations would have solely been based on multipliers, enterprise values would have decreased. It is therefore recommended to put both the CAPM and the weighted-average-cost-of-capital into perspective due to difficulties in risk premium and beta-factor calculations (Janos and Tracia 2012). Beside CAPM’s adjustment, transaction multipliers could be applied to settle the influence of monetary policy measures (Janos and Tracia 2012). However, it should be avoided to replace standard procedures by the multipliers approach due to their orientation on past developments (Jonas 2009).

In the case of PE and VC investments, enterprise values are finally adjusted by marketability, control premiums and minority discounts. In addition, enterprise values are dependent on exit options (Natusch 2002).

This section shortly attempts to explain the overall complex issue of firm valuation, both for investments in SMEs and bigger-sized enterprises. Moreover, this section shows that standard procedures lose their reliability in the case of extraordinary circumstances such as the financial

crisis. Therefore, valuation results have limited validity and only serve as an approximation for negotiation purposes. The issue of negotiation is clarified in the subsequent section.

4.4.5 The literature regarding negotiation and contracting

Negotiations are based on the investment proposal and are concerned with the purchase price, the investment amount, the type of financial instrument, guarantees and both investor and shareholder rights (Schefczyk 2004). Depending on the negotiation results, the full purchase price is paid within one financing round (Simon 2009) or in instalments according to milestone agreements (Schefczyk 2004). In order to avoid investor's share dilution during subsequent capital measures, contracts also consider the so-called anti-dilution protections. In particular cases, shareholders are obliged and/or entitled to sell their shares for equal conditions in the case of investor's exit. A particular agreement refers to the competition prohibition of the management team or the founder (Schneider 2003). Finally, contract clauses could be associated with the liquidation of the enterprise and investor's right to prompt an IPO. A so-called liquidation preference refers to the preferred repayment of the investor (Simon 2009). This specification is not final and depends on the circumstances and negotiations.

Negotiations are most concerned with warranties. Investors do not only rely on audit results but require guarantees of the enterprise owners regarding the completeness and correctness of information (Thum et al. 2008). Guarantees could refer to every due diligence review and investors could claim for compensations in the case of infringements. However, trivial cases could be excluded from warranty obligations (Picot 2008b). In addition, guarantees are limited due to the consideration of the so-called disclaimers which exclude specific liability cases. Guarantees are one of the most important reasons for both breaking-off negotiations and litigations (Thum et al. 2008).

In relation to an economic point of view, Schneider (2003) concludes a minor importance of contract clauses due to the scope of exit possibilities during the millennium turn. He further mentions a significant tightening of contract structures during the subsequent downturn. Kollmann and Kuckertz (2004) agree with the findings from Schneider (2003). They mention a particular awareness of investors regarding liquidation preferences on the one hand, beside an increasing complexity of deal structures on the other hand. According to their conclusions,

venture capitalists try to compensate the increasing uncertainty during market's decline. A similar development is also observed during the financial crisis (Meyding and Grau 2012).

Negative developments of the enterprise after contract signing could be compensated by the so-called material-adverse-change-clauses. In 2008, such contract clauses were considered in 21% of the cases. This proportion decreased to 16% each in 2010 and 2011 (Meyding and Grau 2012). Taking into consideration that Germany's GDP decreased by 0.23% between 2007 and 2009 and increased by 4.2% in 2010 and 3% in 2011 (Destatis 2013), contract designs obviously react in relation to economic conditions. Interestingly enough, investors obviously try to compensate for the aftermath of the financial crisis by the prolongation of warranty periods. This could be a sign that both PE and VC investors are rather unsure regarding future economic developments which would directly affect their portfolio companies.

According to Hummel's (2011b) research results, approx. 5% of the investment proposals in 2004 and 5% on average for the period between 2007 and 2008 were finally considered for investments. These results almost correspond with the research findings from both Zimmermann and Fischer (2003) and Achleitner et al. (2006 and 2010) who refer to investment proportions of approx. 6% each for the research periods of 2001, 2004 and 2007 until 2009. However, these relative proportions are associated with the decline in the number of investments due to the significant decrease in the number of business proposals. Nevertheless, this total market view is not valid for every type of investor. In the case of the MBGs, the increase of the investment proportion from 23% to 29% between 2001 and 2009 partly compensates for the decrease in the number of investment proposals. Thus, their number of final investments remained quite stable. Overall, the investment proportion of the MBGs is comparatively large and fits into the large proportion of business proposals which are considered in the analysis process (see table 17 in appendix D). This might be a consequence of their business model as self-helping institutions (see section 4.2).

The second part of the investment process, the so-called post-investment phase, is clarified in the subsequent sections.

4.4.6 The literature regarding monitoring and mentoring

This phase is both concerned with the monitoring and the mentoring of the portfolio companies. In typical cases, monitoring and mentoring is realised by investor's board representation and associated with financial information on a regular basis (Mitchel et al. 1995; Nathusius 2001). According to research results for the VC market in the UK, Mitchel et al. (1995) mention that core financial statements include the balance sheet, the profit and loss and, furthermore, the cash-flow statement. Approx. 25% of the survey respondents expect an additional performance summary. The majority of these sample members receive the reporting package on a monthly basis (Mitchel et al. 1995). Brinkrolf (2002), who was research active regarding VC firms' management support in Germany, agrees with the results from Mitchel et al. (1995). He reports that 81% of the survey respondents expect a monthly reporting package and only 7% on a quarterly basis. Hummel (2011b), who examined the German PE and VC market, inter alia, during 2006 and 2009, mentions that approx. 75% of the survey respondents expect monthly reporting packages. Thus, he agrees with the research results of Mitchel et al. (1995) and of Brinkrolf (2002). In that context, board representation obviously plays a significant role in the interaction between investors and entrepreneurs. Kranz (2008), who examined the management support of PE and VC firms in Europe, reports that almost every survey respondent is represented in the board of the portfolio company. Moreover, the survey respondents have informal contacts or participate in management meetings. Moon (2006) argues that PE investors are represented in the board in order to interact with the executives in a close relationship and an open discussion level. This strong link between investors and portfolio companies is also required to intervene immediately in the case that the portfolio company does not perform accordingly (Brinkrolf 2002).

With regard to typical mentoring areas of venture capital firms, Brinkrolf (2002) refers to strategy, finance, organisation and operation, networking and cooperation, and finally human resources. The literature base shows that market members are most concerned and involved in financial monitoring and strategy development. This applies both for VC firms and for universal PE investors and regardless of the examination perspective. The examinations in that respect are either based on an investor or an entrepreneurial perspective (Brinkrolf 2002; Pankotsch 2005; Sobczak 2007; Wexlberger 2011). Furthermore, Klier et al. (2009) supplement that investors would be also focused on selling non-core assets and on the optimisation of the working capital.

Nevertheless, the degree of involvement in the PE and VC market varies even though the market members are overall strongly connected to their portfolio. In that respect, Brinkrolf (2002) distinguishes six different influence intensities from no involvement, information related requests, the consultation of portfolio companies, decision making, full decision making, up to the full management responsibility. With regard to the support extent, results in the literature base are not consistent. It is overall rather difficult to determine reliable support durations of equity investors, which obviously differ according to different examination perspectives. In that respect, Röper (2004) calculates an average support duration of 26 hours on the level of lead investors and 14 hours on the level of co-investors per month. According to his survey, these periods compromise support regarding strategic planning and networking, the role as a confident and mentor, and additional activities regarding operations, product development and crisis management. On the other hand, Brinkrolf (2002) calculates an average support duration of approx. 16 hours on the level of lead investors per month. These different results could also be dependent on the different examination perspectives of the research studies, either investor or enterprise-owner based. In addition, Wexlberger (2011) calculates an average support duration of approx. 29 hours per month on the level of CVC firms, approx. 22 hours per month for independent investors and approx. 13 hours for public investors. These different results show that it is rather difficult to determine a reliable average support duration in the market. These durations are obviously not only differing according to the particular examination perspective but, moreover, are dependent on the particular type of investor. Overall, these results should be considered in relation to the specific sample and perspective. Thus, they are not valid for the entire PE and VC market.

In terms of a simplification, the market is divided into hands-on and hands-off investors. In that respect, the research results of Zimmermann and Fischer (2003) show that approx. 50% of the survey respondents support their portfolio companies hands-on between 1999 and 2001. A more detailed view shows that approx. 58% of the independent investors are supporting hands-on beside a proportion of 10% in the case of the MBGs. Interestingly enough, 65% of early-stage investors are actively involved beside a proportion of 35% in the case of later-stage investors (Zimmermann and Fischer 2003). Early-stage investors obviously try to minimise the comparatively large default risk by an intensified support. Achleitner et al. (2006) report a similar involvement between 2002 and 2004, followed by an increasing number of actively involved investors between 2007 and 2009 (Achleitner et al. 2010). Hummel (2011b) supplements these research results and refers to the remarkable development in the case of the

MBGs. Their support effort increased significantly from approx. five hours in 2004 to 19 hours in 2009. This development was accompanied with both an increasing number of personal contacts and an increasing awareness regarding portfolio companies strategy. Even though back-financed by public institutions, MBGs obviously reacted according to their dramatic loss proportions of 38% in 2008 (BVK 2009a) and 53% in 2009 (BVK 2010b).

The investment period of equity investors is finalised by the so-called exit. By selling the equity share, the PE investor tries to realise sufficient profits (Thum et al. 2008). This issue is presented in the subsequent section.

4.4.7 The literature regarding the exit phase

Possible exit channels for PE and VC investors are associated with:

- trade sales;
- secondary buy-outs;
- initial public offerings;
- buy-backs;
- liquidations (Thum et al. 2008);
- repayments of silent investments (BVK 2009a; BVK 2010b).

According to research findings, initial public offerings are the most preferred exit channel followed by trade sales, secondary purchases and share buy-backs. Even though exit strategies from PE firms slightly differ due to different business strategies, the most important objective is the maximisation of profits (Pfaffenholz 2004; Röper 2004). The success of an IPO depends on capital market's condition on the one hand (Thum et al. 2008) and portfolio company's past performance on the other hand (Schefczyk 2004). Trade sales are less dependent on environmental fluctuations and associated with smaller transaction-costs, whereas secondary purchases benefit from short transaction periods (Thum et al. 2008). Share buy-backs are least preferred by PE firms due to possible financial constraints on the level of the earlier shareholders (Schefczyk 2004). In separation from the entire market, the MBGs are most concerned with the repayment of their silent investments due to their specific business model (BVK 2009a; BVK 2010b).

Irrespective of the specific economic conditions, the German PE and VC market overall suffers from total losses. However, research data show that the loss proportions increase in the case of unstable economic circumstances. Achleitner et al. (2006) calculate that the proportion of total losses in relation to divestments are 40% in 2004. In the subsequent research, Achleitner et al. (2010) calculate a proportion of 24% in 2007, and a significant increase to 41% in 2009. During these periods, the GDP increased by 1.2% in 2004, by 3.3% in 2007 but declined by 5.1% in 2009 (Destatis 2013). The MBGs and early-stage investors realised the largest loss proportions in any of these periods (Achleitner et al. 2006; Achleitner et al. 2010). IPOs are surely of minor importance due to the limited capital market activity in Germany (see section 2.6.3). During 2005 until 2008, the number of IPOs dropped from 13 to two. In the subsequent phase between 2009 and 2011, the number of IPOs recovered from one to 12 IPOs but finally fell back to eight IPOs in 2012 again (Statista 2015).

At that point, the literature review with regard to the investment process is finalised and the subsequent sections are focused on innovation policy and public funding.

4.5 The innovation policy and public funding

4.5.1 The innovation political developments in Germany

Small and medium-sized enterprises are regarded as very important for innovation, employment and thus for economic growth. In that respect, SMEs had a significant stabilisation effect on employment in Germany in 2008 and 2009 (see section 2.6.1). Nevertheless, SMEs seemed to be disadvantaged in the field of bank and innovation financing (see section 2.6.3). Market failure in that respect is, inter alia, caused by negative spill-over effects on the level of SMEs. The uncontrolled diffusion of knowledge is resulting in additional earnings on the level of enterprises which do not bear the initial or any research costs. This applies in particular in cases in which new knowledge is not or could not be copyrighted. Furthermore, SMEs suffer from financing gaps for research and development due to information asymmetries. In addition, SMEs do not have enough market power in order to penetrate markets effectively with innovative products or services. Finally, SMEs do not benefit from comparable large research budgets and resources as bigger-sized enterprises. Consequently, their research contribution and success is rather weak (see also section 2.6.2).

Even though public funding might also be considered out of an economic point of view, public funding in the context of the present thesis is considered in relation to innovation policy. Public innovation policy is every strategy and measure that influence innovation processes in the economy and the society. Innovation political measures are associated with three different levers in order to influence innovation processes. This could be a direct involvement which is, inter alia, concerned with competition and trade legislation or proprietary rights. In addition, innovation policy might be concerned with input measures through direct R&D financing, risk capital or tax reliefs. An output-oriented strategy of innovation policy would be associated with employment policy, growth policy or regional policy in order to ensure economy's stability and growth. Political measures in that respect could be implemented on European, federal and regional state levels (Welsch 2005).

Innovation policy basically distinguishes between two main concepts, a market-based innovation policy on the one hand and an intervention-based policy on the other hand. A market-based innovation policy classifies innovation as an independent and uncontrollable variable which develops freely according to market mechanisms. Hence, innovation processes are dependent on market decisions according to profit and loss probabilities. The concept of intervention-based policy, on the contrary, follows the path of direct public influence to align the innovation processes along specific subjects. This might also be associated with the direct support of specific industry branches in order to accelerate the structural change in the entire economy. Nevertheless, there is consensus regarding the subsidisation of basic research due to market failure (Welsch 2005).

The initial literature review shows that the German government adjusted the innovation political measures after the millennium change. Due to the economic downturn, the government was concerned with the technology transfer, early-stage financing and enterprise founding. Public concerns resulted in different measures which were bundled in Germany's so-called Hightech-Strategy from 2006. In addition, innovation political measures were aligned with future demand areas which were regarded as economically relevant. Due to the significant increase of world's population, world's energy demand and the effects of global warming, the German government classified climate and energy, health and nutrition, mobility and safety, and communication as the most important research areas. As a result, the public funding policy was also aligned with these research priorities, which were also embedded in the HTS from 2006 (BMBF 2010). In the context of the earlier innovation policy in Germany, which was surely concerned with either an

involvement related or a more market-based innovation policy during 1973 until 1982 and 1983 until 1997, the millennium turn obviously introduced a more integrated approach of innovation policy (Welsch 2005). This seemed to be required not only in order to address short-term developments but also to improve the economy's competitiveness due to an increasing globalisation.

Due to gaps in early-stage financing (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010) and the difficulties with the technology transfer, the German government provides several public funding programmes on the federal level. These programmes are issued from different federal state departments, the so-called Kreditanstalt für Wiederaufbau and the so-called Landwirtschaftliche Rentenbank. The KfW and the Landwirtschaftliche Rentenbank are public-owned banks but, nevertheless, are refinanced over the capital market. They cooperate with the private bank sector in a neutral manner. Therefore, only parts of their services are directly available and the majority of public credits are exclusively provided over private banks. The private bank sector fulfils a leading-through function for the public credits (VOEB 2013). The public credit conditions are comparatively cheap, as public investment banks benefit from their state guarantee. In some cases, public loans are further reduced by capital gains of the public investment banks or are directly subsidised by the government (VOEB 2014).

Funding areas of the KfW and the Landwirtschaftliche Rentenbank are:

- small and medium-sized enterprises;
- agriculture and infrastructure development;
- living space and urban development;
- environmentalism (VOEB 2013).

The present thesis is focused on the KfW as the Landwirtschaftliche Rentenbank is solely busy with the agriculture sector. The KfW is organised in three independent divisions which are focused on supporting enterprises, public institutions or private households. KfW business activities which are not regarded as competitive-neutral in accordance with EU law (see appendix M) are bundled in a daughter company. A second daughter company of the KfW is busy with the financing of developing countries (Asmussen 2008). The financing measures of the KfW regarding small and medium-sized enterprises are bundled in the business area of the so-called KfW-Mittelstandsbank. This part of the KfW is concerned with the financing of:

- enterprise founding;
- SME investments;
- innovation and environmentalism projects (KfW 2010).

Financing measures within these areas differ regarding their duration and conditions.

In addition, the KfW issued three different equity-financing programmes at the time of the financial crisis. These equity-financing programmes were provided to support technology-based enterprises, start-ups and SMEs by co-financing the investments of PE and VC firms. In that respect, the KfW was investing on equal conditions of the lead investor. It was also possible that PE and VC investors refinance their equity investments with specific KfW programmes (KfW 2010; KfW 2010a).

In addition, the innovation policy of the government is also concerned with the funding of individual research projects, research cooperation and networks. The focus of the funding programmes are SMEs and applied research projects (Belitz et al. 2012). The most important research subsidy is the so-called ZIM (see glossary), which is the central innovation programme for SMEs. This research subsidy is issued by Germany's federal department for economic affairs and energy. The second programme, the so-called KMU-innovativ (see glossary), is issued by the German department of education and research. This research subsidy is much more narrowed in its application due to the focus on specific research areas (BMBF 2010; Belitz et al. 2012).

4.5.2 The public funding related developments in Germany

Even though the German government introduced a debt rule in 2009, public expenses for research and development were excluded from these consolidation measures (BMWi 2010). This underlines the public concerns regarding Germany's future economic performance. According to the European Lisbon strategy, which is, inter alia, concerned with an increase of gross domestic expenditures for research and development in Europe up to 3%, the German government agreed on additional expenses for education and research in the amount of approx. 12 billion euros until 2013. Germany's government intended to increase the expenses for education and research, not to be confused with research and development, up to 10% of the GDP. These measures, beside the further improvement of Germany's scientific system and its internationalisation, are also part of the HTS (BMBF 2010).

The initial literature review also shows that the government intensified both research funding and equity-financing measures during the initial phase of the financial crisis. The government in that respect spent additional 900 million euros for the programme ZIM and increased the equity financing funds of the KfW in the amount of additional 220 million euros. Furthermore, the government prolonged High-Tech Gründerfund's (see glossary) investment period and modified the earlier HTS from 2006 (BMWi 2010). Moreover, the KfW received additional governmental funding for both SME and innovation financing purposes (KfW 2010). The additional funds for research support were part of the conjuncture programmes in order to prevent adjustments in the research budgets of the enterprises (Belitz et al. 2012). Earlier experiences during economic downturns, as during the oil crisis and the world economic crisis of 1973 and 1974, have shown that enterprises reduced their research budgets to save their profitability (Welsch 2005).

In order to receive a detailed overview of KfW's business activity in the field of equity financing, SME and innovation financing, and in order to separate financial crisis related measures, the annual support reports of the KfW are reclassified. This reclassification of the annual support report 2009 (KfW 2010a) results in following categories:

- enterprise founding and SME financing;
- equity-financing programmes;
- innovation financing;
- financial crisis related measures (KfW 2010).

This initial analysis of the KfW report for 2009 (KfW 2010a) shows that the demand on KfW credits decreased due to the significant economic decline. Therefore, the KfW launched a new programme, the so-called KfW-Sonderprogramm, to boost SME investments on the one hand and to support the credit provision of private banks on the other hand (KfW 2010). Without these additional measures, the business volume of the KfW would have declined from approx. 11.4 billion euros in 2008 to approx. 8.8 billion euros in 2009. In addition, the volume of KfW's equity programmes decreased in accordance with the development of the entire PE and VC market in Germany (see section 4.2). The subsequent table 18 details the financing amounts of the KfW in the selected areas.

The financing volumes of the KfW		
Year	2008	2009
Funding area	MEUR	MEUR
Enterprise founding and SME financing	10,212	7,400
Innovation financing	888	1,220
Equity financing	261	201
Subtotal	11,361	8,821
Financial crisis related measures	0	7,948
Total	**11,361**	**16,769**

Table 18 The financing volumes of the KfW (derived from KfW 2010a)

With regard to the further development of the research subsidies ZIM and KMU-innovativ, the initial analysis shows that the volume of disbursed subsidies for the programme ZIM increased from approx. four million euros in 2008 to 155 million euros in 2009. This significant increase was caused by additional funding measures from the conjuncture programmes (see sections 2.4). Obviously, as an attempt to stimulate the research and development contribution of the smaller enterprises in Germany (see table three in section 2.6.2). The more technology-focused programme KMU-innovativ on the other hand increased from approx. eight million euros in 2008 to approx. 45 million euros in 2009 (Rammer et al. 2011). The different amounts underline the more narrowed application of the programme KMU-innovativ with its focus on cutting-edge research (BMBF 2010; Belitz et al. 2012).

This section regarding public funding finalises the literature review which is subsequently summarised in order to develop a basic theory.

4.6 The literature synthesis, the literature gap and the basic theory

4.6.1 The literature synthesis

The literature synthesis summarises the main findings from the literature review. The literature review of the present thesis is concerned with following areas:

- conjuncture crises and the financial crisis;
- economic development during the financial crisis;

- economic contribution of small and medium-sized enterprises;
- innovation related developments in Germany;
- innovation and SME financing in Germany;
- Germany's PE and VC market;
- investment process of equity investors;
- Germany's innovation policy;
- public funding and public subsidies on the federal level.

Initially, the literature review showed that the US sub-prime crisis led to a global bank and economy crisis, and finally to state debt crises. There are obvious similarities in the present crisis and earlier financial crises which were associated with market and loan expansions, bank crises and conjuncture downturns. These earlier crises required both central banks' and governments' intervention which finally resulted in an increasing public indebtedness**.** A remarkable aspect is associated with the agreement of Bretton-Woods. It is supposed that the agreement's end would have been responsible for the subsequent eras of debt, financial and real estate crises (see section 2.1).

Due to similar business models in the finance sector and its strong interconnection, the US sub-prime crisis spread globally (see section 2.3). Worldwide impacts in the financial system resulted in economic downturns which required large conjuncture programmes. The extent of stabilisation measures caused state debt crises on the one hand and a currency crisis in Europe on the other hand. Even though Germany's economy initially developed in a rather stable way in 2007 and 2008, the GDP decreased significantly by 5.1% in 2009 (see section 2.4). In the so-called post-crisis phase, the world's economy recovered in 2010 but declined in 2011 again. In Europe, the ECB continued the expansive monetary policy in order to stabilise both the bank system and the economy (see section 2.5).

With regard to Germany's economic structure, the literature review showed that approx. 99% of enterprises are small and medium-sized according to the classification system of the EC (see table two in appendix B). This enterprise size is very important for the economy's development due to employment and qualification contributions but also for research and development and for the diffusion of innovations. In that respect, SMEs benefit from short communication processes, motivated staff and flat hierarchies. On the other hand, SMEs innovation contribution is hampered due to difficulties in employing qualified staff, their weak market orientation and the

limitation of financial resources. Nevertheless, economic growth does not only require innovation but in particular innovative entrepreneurs for the technology transfer (see section 2.6.1). Statistics show that both the number of fulltime and sideline foundations in Germany decreased significantly between 2005 and 2012 (IfM 2014). Even though the number of freelancers increased by approx. 130% between 1994 and 2014 (Welter 2015), it seems questionable if this type of founding, which should be rather regarded as an alternative to regular employment, would have compensated for the decreasing proportions of standard enterprise foundings.

In addition, research data show that the proportion of innovators in Germany, which were concerned with product, process, marketing and organisation innovations, decreased significantly between 2008 and 2012. Estimations for 2012 show that approx. 51% of enterprises in Germany were research active but only 38% were product and process innovators. Moreover, data show that the research and development activity of enterprises is significantly increasing in relation to the enterprise size. This innovation behaviour is resulting in a significantly larger proportion of both product and process innovators on the level of enterprises with more than 1,000 employees. These developments were accompanied with decreasing revenue proportions of innovations between 2008 and 2012, even though shortly interrupted by periods of recovery each in 2010 and 2011. Beside this progress, data interpretations result in the assumption that the research contribution and success of Germany's economy is dependent on specific industry branches and enterprise sizes. The contribution of SMEs up to 249 employees is obviously very small, not completely exhausted and hence expandable. This applies in particular for SMEs which employ between five and 49 employees (see section 2.6.2).

The literature review has also shown that SMEs are disadvantaged in bank financing both for general and for innovation related purposes. This disadvantage should have been intensified due to the modification of the minimum capital requirements for banks, which were implemented in 2013 (BIS 2010). Therefore, SMEs basically prefer self-financing. Nevertheless, the literature underlines that SMEs are dependent on bank financing too due to the limitations of alternative financing channels, for instance capital market or equity financing. In that respect, it is very difficult for SMEs to be refinanced over the capital market, not only due to size requirements, but also due to the declining capital market activity since the millennium turn. Time series show that both the number of IPOs and the number of shareholders decreased between the millennium turn and the year 2012 (see section 2.6.3).

With regard to the development of Germany's PE and VC market, data has shown that both private equity and venture capital investments decreased significantly between 2007 and 2009. During the post-crisis phase, the investment amounts increased from approx. 4.9 billion euros in 2010 to 6.5 billion euros in 2012. Venture capital investments recovered and resulted in approx. 729 million euros in 2010 but finally declined to approx. 549 million euros in 2012. These investment amounts were accompanied by decreasing fund raising volumes between 2007 and 2012 (EVCA 2013). In that context, data also showed that the German PE and VC market is comparatively small. This applies not only with regard to the nominal investment amounts in a country related perspective but also with regard to the proportion of equity investments from the national GDPs (see section 4.1).

In addition, the literature review showed that the German PE and VC market was incrementally winning on market maturity between 1999 and 2009. This assumption is derived from an increasing specialisation trend on the one hand and an increasing investment experience during this decade on the other hand. Due to significantly changing economic conditions after the millennium turn, investors had to change their strategy and began to focus on later-stage investments. In addition, the market was also described from an increasing proportion of bigger investment funds. The withdraw from early-stage and expansion related investments was accompanied with increasing investment amounts on the one hand and an increasing competition on the level of later-stage investments on the other hand. In order to close market gaps, the literature review showed that the market was substantially subsidised by means of public funding. This proportion of public support is significantly larger on the level of early-stage investments than on the level of later-stage investments (see table 14 in section 4.3). During the initial phase of the crisis, the market suffered from an increasing proportion of total losses which caused an increasing hands-on mentality of PE and VC investors. At the same time, market participants were prompted to reduce their return expectations. During the initial crisis phase, a major proportion of deals were not realised as negotiation parties were not able to agree on specific rights or enterprise values (see section 4.3). A major concern in the German PE and VC market was associated with the so-called AIFM-directive, which was adopted by the European parliament as a consequence of the financial crisis. This directive was transformed into a national law in Germany in 2013 in order to establish a legislation framework for investment activities outside the financial sector. Furthermore, market members in Germany were concerned due to the rejection of a German law initiative by the European Commission. This legislation was focused on the improvement of start-up financing conditions in Germany (see section 4.2).

The literature has, moreover, shown that one particular aspect in Germany's PE and VC market is associated with the so-called Mittelständische Beteiligungsgesellschaften. This type of investor is focused on silent investments in small and medium-sized enterprises. Due to their business purpose as a self-helping institution for SMEs, they are less profit-oriented and have smaller return expectations. In comparison to the entire market, MBG's investment and loss proportions are significantly larger (see sections 4.2 and 4.4.7). Even though rather restrained investors, MBGs influence regarding portfolio companies' operations and strategy increased significantly between 2007 and 2009, as did their entire mentoring effort (Hummel 2011b).

In order to minimise the risks of adverse selection, moral hazard and hold up (see section 3.1.3), PE and VC firms are investing along an investment process. This process chain represents the institutional framework of equity investors. The literature review refers to the chain components of the so-called deal flow, the deal screening, the negotiation and contracting, the monitoring and mentoring, and the exit. These phases might be defined as the core investment process of PE and VC firms (see section 4.4 and figure seven in appendix H).

With regard to the deal flow, networks, banks and direct requests were the most important deal sources between 1999 and 2009. In that respect, the literature showed that the bulk of investment requests declined significantly after the millennium turn and since then remained rather stable (see section 4.4.1). The initial screening of these business proposals is focused on the quality of the management team, the product and the market, and the financial aspects. Approx. 80% of the proposals are rejected after this initial check. The remaining 20% go through the process of detailed screening, the so-called due diligence (see section 4.4.2). Detailed screenings are focused on the management team, the product and the market but in particular on financial aspects (see section 4.4.3). Furthermore, the literature showed that the multipliers, the discounted cash-flow and the earnings value method are the most preferred valuation procedures of equity investors in Germany. Research results in that respect show that investors do not intend to exchange these valuation procedures even though specific determinants of the approaches might have been negatively affected from crisis' impacts (see section 4.4.4).

The phase of negotiation, which is concerned with the final investment decision and contract signing, is directly affected by the economic circumstances. The literature review showed that in the case of conjuncture downturns, the complexity of contracts increases. This increasing complexity might be associated with an increasing uncertainty and investors' attempt to

compensate for the higher default possibility. Nevertheless, the complexity of the contracts immediately normalises during the economy's recovery (see section 4.4.5).

Even though the number of investment requests declined between 2001 and 2009, the final investment proportion of 6% remained stable during the same period. This applies for an entire market perspective. The detailed examination showed that the investment proportion of later-stage investors is significantly larger in comparison to early-stage investors (see table 17 in appendix D).

During the post-investment phase, PE firms are most frequently busy with strategy's development and financial monitoring. Moreover, the results of the literature review have shown that the majority of investors are represented in the supervisory boards of their portfolio companies. Long-term analyses show that the market in Germany is dominated by hands-on investors. Nevertheless, every type of investor, irrespective of being hands-on or hands-off, is increasing the support of the portfolio in the case of particular circumstances or portfolio company's underperformance. Furthermore, the literature review showed that mentoring efforts overall increased during the initial phase of the financial crisis. This applies both for the entire market and for the MBGs (see section 4.4.6).

With regard to exit channels, the literature refers to trade sales, secondary buy-outs, initial public offerings, buy-backs, total losses and the repayment of silent investments. IPOs are the most preferred exit channel due to possible capital gains. Buy-backs are the least preferred exit channel due to possible financial constraints of the earlier shareholders. Overall, the PE and VC market suffers from total losses, which significantly increased during the initial phase of the financial crisis (see section 4.4.7).

Beside the application of an investment process to limit the investment risk, the German market also benefits from public funding measures. Public funding programmes for equity investments are, inter alia, provided from the KfW. This state-owned bank also provides public financing measures for SME investments, for innovation projects and for enterprise founding (see section 4.5.1). These public funding measures are provided in order to settle market imbalances and to stimulate the economy. During the initial phase of the financial crisis, the KfW received additional governmental funding for both SME and innovation supporting purposes (see section 4.5.2).

With regard to Germany's innovation policy, the developments after the millennium turn prompted the government to align the national innovation strategy on economical relevant areas. The public funding measures were aligned on these priority fields too, and the national innovation strategy was summarised in the so-called Hightech-Strategy 2010. This strategy was launched in 2006. In that respect, the government obviously applied a more strategic and integrative approach of innovation policy. Nevertheless, the basic political orientation of the government was still associated with an intervention-based innovation policy rather than a market-based orientation (see section 4.5.1).

Although the German government followed a course of strict household consolidation as a consequence of the increasing public indebtedness, the government agreed on additional expenses for education and research. Moreover, the most important research subsidies on the federal level, the so-called ZIM and KMU-innovativ, were modified during the initial phase of the crisis. In that respect, the German government spent additional 900 million euros on the programme ZIM and expanded its application on bigger-sized enterprises. Hence, the amounts of disbursed research grants increased significantly during the initial phase of the financial crisis. In addition, the government increased the expenses for the equity financing programmes of the Kreditanstalt für Wiederaufbau and prolonged the investment period of the so-called High-Tech Gründerfund (see section 4.5.2). Moreover, the government relaunched and modified Germany's national innovation strategy in 2010 (BMBF 2010). These initial results in the run-up and during the financial crisis are the foundation of the present research study.

4.6.2 The literature gap

Basically, the present thesis is concerned with the German economic, innovation and public funding policy. This includes the public financing measures for SME investments, innovation projects, enterprise founding and equity investments on the one hand and public research subsidies on the federal level on the other hand. Moreover, this thesis is concerned with the development of the German PE and VC market with a focus on early-stage, public and semi-public investors. The examination timeframe of the present thesis is the post-crisis phase of 2010, 2011 and 2012.

The present research builds on the cross-sectional studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). These descriptive analyses, which were

carried out on behalf of the KfW, are concerned with the progress of the German PE and VC market since the millennium turn. It was confirmed by the KfW during the research proposal stage that no further examination regarding the German PE and VC market was carried out on their behalf at research moment. Beside these researchers, the desk of Professor Hummel at the University of Potsdam was also research active regarding Germany's PE and VC market between 2001 and 2009. In contrast to the research studies of the KfW, Hummel examined the German PE and VC market from year to year. The latest outcome of this research programme resulted in a summary and comparison of the research results from 2008 and 2009, and thus for the initial period of the financial crisis (Hummel 2011b). This final analysis supplements the latest research study from Achleitner et al. (2010) regarding developments of Germany's PE and VC market during the initial phase of the crisis. It was confirmed by the responsible researcher at the University of Potsdam that this longitudinal examination was not continued. In that respect, there was no overlap regarding the present research.

In addition, the literature review showed that several researchers were research active with regard to the investment process. The majority of reviewed researchers were focused on one specific process step rather than on the whole investment process. Hence, the results of the literature review support the assumption that no researcher was focused on the changes along the whole investment process for the time being. This conclusion applied at least for the research timeframe and in accordance with the present sample frame.

Since public funding measures are tax financed, the literature review showed that several economic research institutes are busy with the issue of public financing. For instance, the Centre for European Economic Research in Mannheim regarding the evaluation of the programme KMU-innovativ (Rammer et al. 2011) or the German Institute for Economic Research in Berlin regarding innovation funding in Germany (Belitz et al. 2012). Therefore, it could not be ruled out that researchers were examining the public funding policy in the present examination fields.

Nevertheless, it was confirmed that the basic studies of the present thesis were not continued for the years 2010, 2011 and 2012. In that respect, it could finally be concluded that there was a literature gap for the timeframe 2010, 2011 and 2012.

4.6.3 The basic theory

This section shortly summarises the literature review synthesis (see section 4.6.1) in order to develop a basic theory.

The liberalisation of the financial market and the expansion of the money supply were accompanied with the development of innovative financial products. In order to improve their earnings, financial intermediaries all over the world invested excessively in these financial products. The over indebtedness of private borrowers finally resulted in an increasing depreciation of banks' credit portfolios which were refinanced with innovative financial products. The further progress caused the collapse of leading financial institutions and of the world's financial system. The recapitalisation of the bank system was accompanied by conjuncture downturns which required additional public stabilisation measures. The extent of public investments and the expansive monetary policy finally caused state debt crises on the one hand and a currency crisis in Europe on the other hand. As a consequence of the financial crisis, the AIFM-directive was implemented to supervise the managers of alternative investment funds. In the initial proposal, this directive required a minimum stock on the equity of fund managers, the implementation of a risk management system in the fund holding and the application of most current audit systems. In addition, the earlier minimum capital requirements for banks, the so-called Basel II accord, was replaced by the so-called Basel III accord.

The literature showed that 99% of enterprises in Germany are small and medium-sized. This type of enterprise-size is regarded as very important for employment, qualification and innovation. However, statistics show that the proportion of SMEs in permanent research, their expenditures for research and development, and their innovation output is comparatively small. In relation to their proportion on economy's enterprise stock, the research contribution of SMEs is regarded as expandable. Even though the gross domestic expenditures for research and development were steadily increasing between 2000 and 2012, the proportion of product, process, marketing and organisation innovators in Germany was decreasing between 2008 and 2012. This progress was accompanied with both decreasing revenue proportions of innovations during 2008 and 2012, and a decreasing proportion of enterprise foundings between 2005 and 2012.

The literature, furthermore, showed that SMEs are both dependent on self and on bank financing but seemed to be disadvantaged by banks due to several reasons. This applies in particular in the

case of innovation financing and enterprise foundings. The introduction of Basel III should reinforce that disadvantage as banks lending practices should be further strengthened. Possible financial constraints might partly be compensated by alternative financing channels. In that respect, several public institutions on the federal level provide different public funding programmes for SME investments, innovation projects, enterprise foundings or for equity investments. In addition, federal level institutions provide several research subsidies. Research data so far show that the government increased the expenses for the most important research programmes during the initial phase of the financial crisis. In addition, the biggest public-owned bank on the federal level, the KfW, launched a specific investment programme to stimulate the investment activity of SMEs. The government, moreover, increased the fund volume of KfW's equity financing fund, prolonged the investment period of the High-Tech Gründerfund and relaunched the earlier Hightech-Strategy from 2006 in 2010. An alternative financing channel for SMEs, innovation and start-up financing is represented by the PE and VC market. The German PE and VC market is described from an increasing proportion of later-stage and large-size investments since the millennium turn. As a consequence, market participants argue that Germany's PE and VC market would suffer from market gaps in early-stage and smaller volume investments. In order to settle market imbalances in that respect, the PE and VC market is supported by means of public funding measures. This applies in particular for early-stage investments in order to settle the larger investment risks.

Moreover, the literature review showed that the different types of PE and VC investors follow different investment strategies and also apply different investment behaviours. On the level of their investment strategy this is, inter alia, associated with the financing purpose, the type of equity investment and the selected industry branches. On the level of their investment behaviour this is, inter alia, associated with their application of public funding, their investment proportion and their number of portfolio companies.

Finally, the literature review showed that PE and VC investors are operating along an investment process. This process chain is composed of the deal flow, the deal screening, the contract negotiation, the monitoring and mentoring, and finally the exit. Each of these phases are composed of different components which react and hence change their significance in relation to the economic circumstances.

These results of the literature review defined following problem areas in Germany's economy. At first, this is associated with a declining entrepreneurial activity (see section 2.6.3). Moreover, this is associated not only with a one-sided innovation contribution but also with a declining innovation activity and success (see section 2.6.2). In addition, this is a declining capital market activity and funding limitations for SMEs, innovation and in particular for early-stage financing (see section 2.6.3). Finally, this is a comparatively small PE and VC market in Germany (see section 2.6.3 and section 4.1).

These areas, rather than being a consequence of a particular event seemed to be the result of long-term developments and should not be appraised in isolation. In order to ensure an interlinked view, this research examination applies a more flexible procedure and is therefore based on Laughlin's approach of so-called middle-range thinking (Laughlin 1995). This research approach, which is neither based on a too open nor a too detailed theory and research methodology, follows the middle way in theorising and methodology specification (Laughlin 1995 and section 5.3). As a result, and in accordance with the literature review outcomes, this research examination is not based on a set of detailed hypotheses but rather based on a skeletal theory. This skeletal theory might or might not be enriched as a result of the research process. With regard to the present research study, this skeletal theory is associated with the following presumptions.

First, under the assumption that technical progress requires the investment in knowledge and this investment proportion would be too small under an economic point of view, then market failure requires public support (Welsch 2005). If technical progress and patents alone would be insufficient for economic growth in accordance with Schumpeter's theory, which would also require innovative entrepreneurs (Schumpeter 1985; Schumpeter 1987), and if the technology transfer in that respect is weak, then public support is required too. As a result, the German government should have adjusted the economic, the innovation and hence the public funding policy in order to support SMEs, innovation, enterprise founding and the technology transfer.

Second, under the assumption that the financial crisis has caused an increasing risk awareness of PE and VC investors, investors might have changed their investment strategy and investment behaviour during the post-crisis phase. With regard to their investment strategy, PE and VC firms might have, inter alia, changed their strategy regarding the financing purpose, the particular type of equity investment and their selection of specific industry branches in order to

counteract crisis' impacts and to reduce their investment risk. With regard to the investment behaviour, PE and VC firms might have increased the application of public funding, might have increased their syndication proportion and finally might have decreased their investment proportion. The overall effects on the level of PE and VC investors' investment behaviour should have also affected the total fund volumes, the total investment volumes, the number of investments and the number of portfolio companies.

Third, if the indicators along the components of the investment process change their respective importance in the context of economic circumstances, components might have changed their specific weight during the post-crisis phase too. This should in particular apply on the level of the decision making process and an increasing emphasis on the management team, an increasing proportion of failed contract negotiations due to specific contract rights, a change on the level of mentoring areas importance and an increasing mentoring extent during the post-crisis phase.

Fourth, as the AIFM-directive requires alternative investment fund managers to save a minimum stock on capital, to implement a risk management system and to utilise most current audit systems, then AIFM-directive's implementation might have effects on PE and VC investors' deal selection, deal screening and monitoring too.

The final presumption argues that PE and VC investors might tend to prefer or avoid investments in specific industry branches due to the implementation of Basel III.

These presumptions form a skeletal theory in accordance with Laughlin's approach of middle-range thinking (Laughlin 1995). The presumptions are embedded in a research question and an aim and objectives which are presented in the subsequent section. The examination perspective was not finally fixed in order to allow for theory's possible enrichment (Laughlin 1995).

4.6.4 The research question, the aim and the objectives

The research question of the present examination is:

How did Germany's equity market and public funding policy develop during the post-crisis phase of 2010, 2011 and 2012?

The aim of the present examination is:

To examine the developments of Germany's economic, innovation and public funding policy, and the development in Germany's PE and VC market during 2010, 2011 and 2012.

The objectives of the present examination are:

1. To examine Germany's economic and innovation policy during 2010, 2011 and 2012.

2. To examine the progress of public funding on the federal level for SME investments, innovation projects, enterprise founding and equity investments.

3. To examine the German PE and VC market on the level of early-stage, public and semi-public investors, and:

   a) on the level of investors investment strategy, derived from:
      - the financing purpose;
      - the type of equity investment;
      - the investment classes;
      - the industry branches;

   b) on the level of investors investment behaviour, derived from:
      - the application of public funding;
      - the proportion of syndicated investments;
      - the investment proportion;
      - the total fund volume;
      - the total investment volume;
      - the number of investments;
      - the number of portfolio companies;

   c) on the level of investors investment process, derived from:
      - the proportion of deal sources;
      - the relevance of business plan components;
      - the relevance of due diligence components;

- the proportion of break-off reasons;
- the relevance of monitoring components;
- the extent of mentoring;
- the proportions of exit channels;
- the effects of Basel III and of the AIFM-directive.

Chapter 5 The research methodology

This chapter initially presents the research methodologies which were already applied in the underlying research area and, moreover, discusses the pros and cons of research methods. In a further step, this chapter is concerned with the clarification of the entire research strategy and subsequently presents the quantitative and qualitative examination procedures of the study. This encompasses the presentation of the respective sample frames. The chapter is finalised by detailing the validation study procedure and the summary of the research process along a timeframe. The clarifications regarding the research methodology are embedded in further detailed specifications regarding research paradigms (see appendix J.1), qualitative and quantitative research (see appendix J.2) and triangulation (see appendix J.3).

5.1 Applied research methodologies in the present research area

The present research programme builds on the research studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). These examinations were carried out on behalf of the KfW to analyse the development of Germany's PE and VC market between 1999 and 2001 (Zimmermann and Fischer 2003), between 2002 and 2004 (Achleitner et al. 2006) and between 2007 and 2009 (Achleitner et al. 2010). Due to the type of sample frame and the remarkable response rates of approx. 50% in each case, the results could be regarded as representative for the entire PE and VC market in Germany. The first study of Zimmermann and Fischer (2003) considers comparable data from UK's PE and VC market for comparison purposes. Due to the subsequent studies of Achleitner et al. in 2006 and 2010, it is possible to describe the development of the German PE and VC market within one decade. Market reactions could be evaluated during an economic downturn after the millennium turn, a period of stagnation between 2002 and 2004, and finally a conjuncture downturn between 2007 and 2009 (Destatis 2013). These studies are based on comprehensive structured questionnaires. Hummel (2011b) applies a similar quantitative research design in order to examine the German PE and VC market cross-sectional between 2001 and 2009. Due to the annual implementation of Hummel's (2011b) studies, it is possible to compare the development of Germany's PE and VC market from year to year. Even though the content of Hummel's (2011b) questionnaire differs from the KfW studies in some aspects (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010), Hummel's (2011b) examination is suitable for validation and expansion purposes. Although exclusively descriptive, each one of these studies is extraordinary

meaningful. The application of descriptive analysis methods preserved the meaningfulness and seems appropriate in relation to the research objectives. Furthermore, Hummel (2011a) was research active regarding innovation and SME financing in Germany. This research examination is also based on a structured questionnaire and concerned with the descriptive analysis of SMEs innovation efforts, financing instruments and financing constraints. These examinations are very good examples regarding the suitability of structured questionnaires to examine larger populations.

On the other hand, several doctoral researchers carried out examinations regarding the relationship of PE investors and their portfolio companies (Brinkrolf 2002; Reißig-Thust 2003; Pankotsch 2005; Kranz 2008; Wexlberger 2011). Thus, their research is much more focused on detailed developments and relationships. Brinkrolf's (2002) research stands for a systematical analysis of investor's mentoring measures on the one hand and their profit contribution on the other hand. Therefore, several hypotheses were derived from literature review results and expert interviews. Data was collected on the level of the portfolio companies by structured questionnaires. Responses were then analysed by means of descriptive statistics and correlation analyses. The results were finally validated by expert interviews. Reißig-Thust (2003) analysed the relationship between VC firms and start-up companies during every phase of the investment process. Therefore, several research hypotheses were derived from a comprehensive literature review. Quantitative data was collected by structured questionnaires on the level of the VC firms. The data was analysed quantitatively to determine the performance contribution of each process step and the whole investment process. The application of descriptive and multivariate correlation analyses in this research programme (Reißig-Thust 2003) resulted in meaningful and comprehensive research outcomes. Pankotsch (2005) developed a quite similar research design but was concerned with the examination of investors' support strategies. Therefore, he analysed data from the investors regarding their portfolios. In order to determine the best possible support strategy in relation to investment returns, several hypotheses were tested by means of multivariate statistical analyses (Pankotsch 2005). These cross-sectional studies analysed both primary and in some cases secondary data. The researchers based their data collection process on samples of typical cases and sometimes on dyadic sample structures for comparison purposes. The majority of sample frames were derived from BVK memberships. Each researcher followed a strong quantitative orientation and analysed data by means of descriptive, correlation and multivariate analyses. Nevertheless, and as a result of their research experience, Brinkrolf (2002) and Reißig-Thust (2003) point out that it would be quite difficult to draw serious conclusions

from causal analyses which are based on small sample sizes. Pankotsch (2005), according to his research experience, supplements that cross-sectional research has limitations and would be unsuitable to describe developments. Therefore, he recommends the implementation of longitudinal research studies. Reißig-Thust (2003) additionally remarks that it would be difficult to address research questions in greater detail by the exclusive application of quantitative methods. Hence, she recommends the application of qualitative research designs for exploration purposes. Interestingly enough, none of these researchers applied any kind of text analysis, text interpretation, or any kind of narrative or semi-structured interview during the main study (Brinkrolf 2002; Vater 2002; Reißig-Thust 2003; Pankotsch 2005; Kranz 2008; Wexlberger 2011). In some rare cases, interviews during the main study were carried out to replace surveys and to collect quantitative data (Brinkrolf 2002; Vater 2002; Hoffelner 2010).

On the other hand, literature review results showed that several researchers carried out case study based qualitative examinations (Kollmann and Kuckertz 2004; Petty and Gruber 2011; Leece et al. 2012). In that respect, Kollmann and Kuckertz (2004) were research active with regard to the decision making process of VC firms. These researchers based their examination on semi-structured interviews which were carried out both on the level of the investors and the portfolio companies. Kollmann and Kuckertz (2004, p. 51) argue: "It is hardly feasible to cover the whole complexity of a venture capitalists decision making with merely quantitative methods". This assumption was confirmed during the present thesis, as one sample member denied to participate due to the application of a structured questionnaire. This sample member pointed out that it would not be possible to capture the investment behaviour, the investment strategy and the decision making process of PE and VC investors on the basis of structured questionnaires. This sample member argued:

"It's simply a quite complicated subject and driven by very individual motivations and environmental conditions".

The interview results from Kollmann and Kuckertz (2004) were taped and afterwards transcribed. This research study delivered new insights regarding the investment decision process of VC firms as a result of the economic downturn after the millennium change. Petty and Gruber (2011) on the other hand criticise the limitations of both post-hoc research and experiments. They point out that post-hoc research might have its limitations due to recall biases, whereas experiments are oversimplifying the process of investment decisions. In addition, they

criticise the application of cross-sectional research studies which overall result in rather similar research findings. Petty and Gruber (2011, p. 174) argue that: “For example, respondents tend to report criteria which are believed to be desirable and also tend to overstate the number of criteria actually considered in the evaluation process”. This assumption is underlined by research findings from Brettel (2002), who also analysed the decision making process of venture capitalists. Brettel’s (2002) research resulted in 103 different decision criteria which are regarded as important in the decision making process. According to their considerations, Petty and Gruber (2011) carried out a longitudinal study which is based on the lifecycle of two funds from one European investor. This examination is concerned with a period of 11 years. In terms of examining the criteria at the moment of decision making, Petty and Gruber (2011) examined archival data from 3,631 deal proposals and 35 investments. The archival data was analysed by means of qualitative text interpretation to address the research question. This research programme, even though based on one investor, resulted in both interesting findings and conclusions for practice. The case study from Leece et al. (2012) on the other hand is concerned with the investment decision making process and the key characteristics of the post-investment phase. Leece et al. (2012) argue that the choice of a case study seems appropriate in order to receive a holistic picture. This case study is based on unstructured interviews both on the level of the investor and their portfolio companies. In order to support the interpretation of the results, secondary data from published reports, internal investment records of the investor and comparable data were also processed (Leece et al. 2012). The data interpretation in that research study is solely qualitative. Although small in sample size and focused on a particular region, these case studies clearly show that alternative procedures are suitable to deliver new and deeper insights.

In the context of research methodologies, Suman et al. (2012) mention the dominance of empirical-quantitative data on the one hand and a gap in multi-method approaches, survey-based, action and case study research on the other hand. They also see the risk of meaningless data sources and point out that the majority of research is based on secondary data. Obviously, Suman et al. (2012, p. 37) see some misdirection when they state that: “If academicians today do not expand their approaches to research, managers will continue to perceive them as irrelevant academicians who address fictitious problems and are not interested in the real world”. Therefore, they recommend the enlargement of research methodologies in order to contribute for both research and practice.

As a result, it is surely not advisable to prefer or to disregard a particular procedure. The application of a research approach should be critically selected in the context of the specific research subject and the research aim. Nevertheless, it is surely difficult to receive an all-encompassing description of reality by the implementation of unstructured questionnaires or interviews. In that case, extensive surveys are required which are best practised by the application of structured questionnaires, for instance the ones applied by Hummel (2011a) and Hummel (2011b), Zimmermann and Fischer (2003), and Achleitner et al. (2006 and 2010). On the other hand, such a research design with an exclusively quantitative analysis might narrow the research perspective where thorough and detailed understanding is required (see also appendix J.1). Hence, case study research, which in the normal case is associated with smaller sample sizes, surely contributes to the knowledge base due to the in-depth orientation.

5.2 The pros and cons of research methods

This section is not concerned with every possible research method and limited to the most common ones in the present research area.

One possible data collection method is represented by the so-called narrative interviews. Even though this type of interview might follow a rough guideline, they normally develop quite freely. A narrative interview is sub-divided in two distinct phases, the main narration on the one hand and the subsequent questioning by the interviewer on the other hand. This method is suitable to explore a particular area of interest in greater detail but is also associated with several particularities. First, the interviewee must be willing to report his subjective experiences, opinions and interpretations. This requires adequate conversation circumstances and active listening of the interviewer. Second, individual responses must be accepted to avoid biases, debates or justifications. Third, the interviewer must follow specific procedures to ensure an ongoing narration without interruptions. The results must be further transcribed in the case that the interview is recorded. This process of transcription is associated with the risk of incompleteness and unintelligibility. Hence, in some cases, the validation of the transcriptions is required by further transcriptions of the initial records (Kempf 2008). Overall, interviews are associated with the risk of biases due to interviewer's influence, are time intensive and require the linguistic competence of the interviewer and the interviewee (Häder 2010). In terms of exploring the research area in greater detail, narrative interviews were carried out successfully by Grethe (2010), Manchot (2010) and Wahrenberger (2011). In some cases, structured interviews

were carried out in order to collect quantitative data during the main study (Brinkrolf 2002; Vater 2002; Hoffelner 2010). Brinkrolf (2002) and Vater (2002) were very successful and achieved impressing response rates of approx. 88% in each case.

Written surveys on the other hand ensure anonymity and the responses could be regarded as unbiased due to interviewer's absence. Nevertheless, there is the risk of non-responses and possible biases due to the uncontrolled survey situation (Häder 2010). Hummel's (2011a) research is an example of a large scale research programme that suffers from non-responses. This examination resulted in a small response rate of 1.4%. In addition, intuitive responses could not be processed or are limited to open categories in the questionnaire. Overall, questionnaires must be self-explanatory, as direct requests are impossible or difficult to receive (Häder 2010).

Text analysis on the other hand is defined as a scientific approach to collect and to analyse the content of texts, pictures, movies and records. This approach both analysis manifest and deferred facts in communication processes and could be quantitative or qualitative in character (Häder 2010 and appendices J.1 and J.2). Kempf (2008) distinguishes between:

- text interpretation;
- qualitative text analysis;
- quantitative text analysis.

Text interpretations and qualitative text analyses are usually based on smaller sample sizes, whereas quantitative text analyses are based on larger sample sizes. The analysis process of text interpretation is quite dynamic and open, whereas in the case of qualitative and quantitative text analyses, processes are descriptive and less flexible (Kempf 2008). Text analyses and interpretations require the analysis of texts along the categories of interest. These categories are derived from a research question or, in the case of an open question, by the inductive exploration of the text material. The difficulty in the development and application of categories along the text material is associated with their objectivity. In some cases, the research subject or term is evidently given in the text, whereas in other cases the detailed interpretation of the text material is required. Due to the risk of hidden information in the material, it is possible that the content is not completely analysed along the categories. In the case of quantitative text analyses, categories are connected with scales to determine frequencies of text contents and/or to evaluate the intensity of messages. Categories which are associated with several meanings should be clarified

in greater detail by the so-called indicators. These indicators require detailed explanation which should be based on several examples. Both the categories and the indicators are finally coded along the text material by encoders (Früh 2007).

This type of method is quite cheap, does not require the cooperation with third persons as in the case of interviews or surveys, and is repeatable as often as required. Furthermore, text analyses are suitable for longitudinal examinations of past developments. On the other hand, text analyses require thorough categorisation and encoding to guarantee objectivity, reliability and validity (Häder 2010).

Every type of research approach and method is associated with pros and cons. Clarifications show that qualitative research on the one hand is more concerned with a subjective perception and interpretation of reality, whereas quantitative research is associated with a positivist and rather objective perspective of reality. In that case, the reality is captured by standardised methods, whereas qualitative research approaches are rather open and more flexible. Mixed-method approaches on the other hand are suitable to cope with the barriers of quantitative and qualitative methods (Kuß 2010; see also appendices J.1, J.2 and J.3).

The subsequent section builds on the initial clarifications in section 5.1 and 5.2, and is concerned with the development of a research strategy for the underlying research study.

5.3 Basic clarifications regarding the research methodology

The aim of the present examination was to examine the economic policy, the innovation policy, the public funding policy, and the PE and VC market in Germany during 2010, 2011 and 2012. This research focus was associated with the following research objectives. First, the examination of Germany's economic and innovation policy. Second, the examination of public funding on the federal level. This encompassed research subsidies and public funding measures for SME financing, innovation projects, enterprise founding and equity investments. Third, the examination of Germany's PE and VC market with regard to investor's investment strategy, investment behaviour and investment process (see section 4.6.4).

These research objectives required a deeper analysis which could not have been achieved by an isolated application of a merely quantitative or qualitative research design. Hence, it seemed

appropriate to combine both quantitative and qualitative research methods in order to examine the research subjects in their interconnection. This applied in particular with regard to the issue of public funding. On this examination level, a purely quantitative research strategy seemed inappropriate to analyse the progress of public funding in relation to the economic and innovation policy on the federal level. Hence, flexibility and openness regarding a suitable research strategy was required to penetrate the different but interrelated subjects.

In that respect, Ulrich (1981) remarks that an appropriate research strategy would be influenced and dependent on social systems complexity. Quantitative research methods would be unsuitable to capture the complexity of social systems. Ulrich (1981) argues that it would not be possible to examine social systems by solely individual methodologies which would contradict the complexity of phenomenon. Hence, he criticises Popper's critical rationalism as a narrowed paradigm that simply reduces sciences by physical assumptions (see also appendix J.1). Grochla (1976) in that respect argues that applied sciences should not exclude particular methods and recommends the application of combined research approaches (see also appendix J.3). Chmielewicz (1979) supplements that researchers should be focused on methodological approaches which enable them to realise new knowledge. He (Chmielewicz 1979, p. 88) criticises that: "…, rather than resulting in discoveries, pure logic and deduction have an inhibitory effect". In that respect, Chmielewicz (1979) distinguishes four different research aims:

- term development;
- theory development;
- pragmatic and normative research.

The term development is concerned with the description of reality, whereas theory development is concerned with cause and effect relationships. Pragmatic sciences are transforming theoretical results into decision making models for practice. Finally, normative sciences are concerned with the development of rational models.

Furthermore, Laughlin (1995) in the context of research regarding accounting systems argues that every kind of empirical research would have limitations. Hence, neither completely subjective nor solely objective research approaches would be able to generate a complete picture of reality. As a consequence of the each one-sided application of research methodologies in accounting research, recommendations for practice were only rarely considered by practitioners.

These circumstances out of Laughlin's (1995) point of view would call for the application of a more flexible research approach. In terms of selecting an appropriate research procedure, Laughlin (1995) argues along the detail of theory and methodological development on the one hand and the requirement of changing the status quo on the other hand. The application of a detailed theory might be possible in research examinations of well-researched areas in which generalisations are possible. On the opposite of low theorising, the examination is based on researcher's perceptions and hence generalisations would not be possible. Both of these extremes would be either associated with a detailed research methodology and a largely irrelevant researcher or a low level of methodology development with a permanently involved researcher. Moreover, these different possibilities of both theory and methodology in research examinations would be associated with either the final requirement of changing the status quo or its acceptance (Laughlin 1995).

Laughlin's (1995) approach of so-called middle-range thinking, rather than being focused, is positioned within these extremes and hence takes a medium position in theory and methodology and also regarding the change requirement. This specific approach is based on the assumption that generalisations about reality would be possible but not guaranteed to exist. Therefore, this approach of middle-range thinking is based on a skeletal initial theory which might be both complemented and enriched during the research progress. In order to ensure theory's possible enrichment, the selection of an appropriate research methodology is also rather skeletal and associated with a medium position too. This procedure allows for flexibility and adjustments during the research process in which the researcher is always involved. By focusing on the middle-point, this approach tries to preserve the strength of each of the one-sided paradigms in order to avoid their respective weaknesses. According to Laughlin (1995), this medium position would be best addressed by German critical theory. However, Laughlin (1995) makes clear that parts of German critical theory's representatives would follow a rather Marxist orientation with clear theoretical assumptions and propositions for change. Therefore, middle-range thinking according to Laughlin (1995) follows the Habermasian path of German critical theory, which is less politically motivated and also associated with a rather strategic orientation of the change requirement. Middle-range thinking is open for accepting the existing status quo on the one hand but also for a change in the case that this is required on the other hand (Laughlin 1995). This procedure was initially applied with regard to the development of a rather skeletal theory which is expressed by a set of presumptions rather than a set of detailed hypotheses (see section 4.6.3). Moreover, this approach of so-called middle-range thinking forms the basis of the research

methodology for the present thesis. Such a proceeding seemed advisable in order to reduce the research risk as a consequence of a one-sided research approach (see section 5.2).

5.4 The research strategy of the present study

In order to address the research question, the research aim and the research objectives (see section 4.6.4), the first part of the research examination is based on a qualitative content analysis. This was initially required to examine the economic and innovation policy on the federal level during 2010, 2011 and 2012 (see section 4.6.4, objective one). Subsequently, the progress of public funding on the federal level was analysed in the context of this initial research perspective. In that respect, every funding programme of the KfW which was associated with SME financing, innovation financing, enterprise founding or equity investments was analysed regarding its specific progress. This included the analysis of programme launches in the respective fields or their ending. In addition, the research subsidies ZIM and KMU-innovativ from the BMWi and the BMBF were also reviewed regarding their progress. The subject of public funding was finalised by examining additional programmes for start-up and for equity financing on the federal level which were launched during the post-crisis phase (see section 4.6.4, objective two). The third examination level is based on a quantitative survey in order to analyse the investment strategy, the investment behaviour and the investment process of PE and VC firms. This also encompassed the application of public funding measures in the PE and VC market (see section 4.6.4, objective three). In order to expand the examination results, a final qualitative content analysis was based on a purposive selection of BVK publications. This part of the analysis focused on the investment process, the AIFM-directive and Basel III. The examination results were finally verified by a validation study in the German PE and VC market. The research strategy of the present examination is presented in the subsequent figure one.

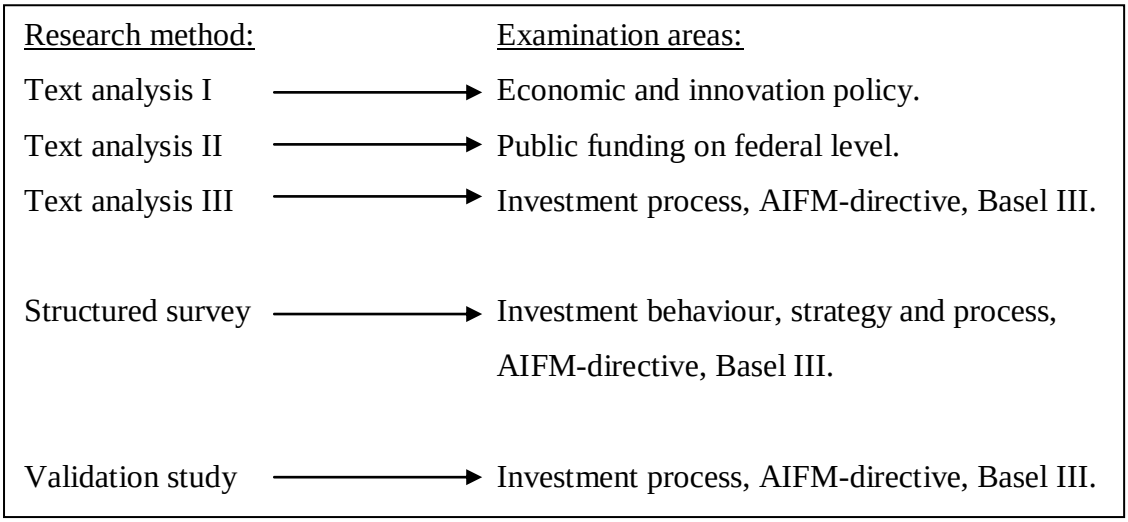


Figure 1 The research strategy (own development)

This research strategy with the combination of both qualitative and quantitative elements was regarded as suitable to collect a comprehensive amount of data and to comprehend long-term developments. Even though this research programme was rather structured and detailed, which partly contradicted Laughlin's approach of middle-range thinking (Laughlin 1995), both the qualitative and the quantitative parts allowed for flexibility in terms of further insights. Finally, this procedure was surely suitable to preserve the variety and the flexibility during the research programme, and in order to allow for skeletal theory's further enrichment.

The subsequent sections initially refer to the quantitative part of the examination and describe the process of questionnaire's development, the sample frame and the analysis procedure. The second part of the chapter is then concerned with the qualitative section and the validation study. This subject order supports the understanding of the results presentation which starts with the qualitative research results.

5.5 The quantitative part of the examination

5.5.1 The development of the questionnaire

As hereinbefore, the examination of market members investment behaviour, investment strategy and investment process based on a structured questionnaire. This procedure seemed appropriate due to time and financial constraints, and the positive experiences of earlier researchers (see section 5.1).

With regard to the development of a questionnaire, it is essential to be fully aware of the research field and the research problem as a result of the literature review. The initial development of the research framework is then concerned with transforming the research subjects into measurable variables. The variables are derived from the literature review (Alemann 1984) and are connected with indicators for quantitative and qualitative evaluation purposes. Scales and indices are introduced to assess the specific characteristic of each indicator (Raithel 2008). It is recommended to base this transformation process on finalised examinations in order to guarantee both research continuity and comparability (Alemann 1984).

Most of the doctoral researchers who were evaluated during the literature review proceeded accordingly. They prepared a research framework which is based on finalised examinations, literature review results and interview results. Such a research framework lay the basis for the development of the final questionnaire (Brinkrolf 2002; Matz 2002; Pfaffenholz 2004; Espel 2006; Kuckertz 2006; Sobczak 2007; Grethe 2010). With regard to the preparation of a questionnaire for the present thesis, this research study follows the recommendation of Alemann (1984) and builds on the finalised research studies of:

- Zimmermann and Fischer (2003);
- Achleitner et al. (2006);
- Achleitner et al. (2010).

These researchers examined the German PE and VC market on behalf of the KfW (see section 4.3) regarding the market structure, the investment strategy of market participants, market gaps and the application of public funding. The initial examination is focused on the timeframe of 1999 to 2001 in order to structure the market in a first attempt (Zimmermann and Fischer 2003). The second study, which was carried out by Achleitner et al. (2006), builds on the initial study from Zimmermann and Fischer (2003). The latest study, which was carried out by Achleitner et al. (2010) too, builds on the previous study (Achleitner et al. 2006) and is concerned with market's development between 2007 and 2009. The context of the questions in each questionnaire partly differs from study to study. Nevertheless, the basic structure of these questionnaires could be summarised under five main categories:

- sample members characteristics;
- investment strategy and investment process;

- changes in the investment strategy;
- gaps in the German PE and VC market;
- application of public funding.

The content of the basic studies (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010) is summarised each in table 19, 20 and 21 (see appendices E.1, E.2, E.3). These summaries are derived from the study content, as the questionnaires of these research studies are not published. These research examinations are descriptive and quite comprehensive in order to describe the developments in Germany's PE and VC market. The researchers either apply closed questions with open categories for the indication of specific values, a selection of answer categories or specific size classes. In order to capture developments during the research timeframes, the researchers apply three-point scales. On the other hand, six-point scales are applied to determine the significance of specific examination variables. This procedure allows for a comprehensive and detailed description of Germany's PE and VC market.

In order to ensure research continuity and comparability as recommended by Alemann (1984) and to benefit from earlier research experiences, the questionnaire of the present thesis was derived from these studies and adjusted with regard to business plan screening, the due diligence, and monitoring and mentoring. Finally, the questionnaire of the present thesis is also concerned with the implementations of Basel III and the AIFM-directive. This questionnaire was designed in order to evaluate developments in the German PE and VC market with a focus on early-stage investors, public investors and the MBGs during 2010, 2011 and 2012. The questionnaire is divided in four different categories:

- respondents' characteristics and investment behaviour;
- respondents' investment strategy and investment process;
- Basel III and the AIFM transformation law.

The design of the questionnaire considers following recommendations. First, the questionnaire is structured from the general to the particular (Kirchhoff 2008). Second, closed questions are associated with a comprehensible number of answer categories. Third, semi-closed questions are introduced with an additional open category (Porst 2009). Fourth, events are captured backwards with the recent event first (Mummendey 2008). Porst (2009) recommends the use of five or seven-point scales. Kirchhoff (2008) also recommends five-point scales due to their neutral

middle point and two different steps on every scale side. The application of vertical scales was avoided as respondents tend to answer in the first third of the scale (Mummendey 2008).

Initially, the ownership structure of respondents refers to a classification in independent firms, corporate venture capital firms, the MBGs and public investors. This procedure allowed for separate calculations on the level of the MBGs and public investors. Overall, values were requested in million euros or in per cent indications each for 2010, 2011 and 2012. Furthermore, tick-box responses are associated with a selection of answer categories or size classes. Developments during the examination timeframe are registered by three-point scales to determine changes or no change. The significance of business plan components at survey's moment is registered along a five-point scale for assessments between less important and very important. The selection of variables is based on the literature of the present thesis and represents the composition of a basic business plan (see section 4.4.2). In order to determine changes along the business plan variables during the post-crisis phase, each business plan variable is assessed along a three-point scale. The same procedure refers to the components of the due diligence (see section 4.4.3) and the issue of monitoring and mentoring (see section 4.4.6). With regard to monitoring and mentoring, it was supposed that the detailed specification regarding the extent of involvement on the level of each component should be rather difficult and would be less meaningfulness. Therefore, the extent of monitoring and mentoring during the post-crisis phase is based on an overall assessment rather than a detailed specification. The questionnaire of the present examination is enclosed in appendix F.1.

Even though structured surveys are associated with the risk of non-response, they benefit from low costs due to the possibility of online processing and their suitability for the examination of larger populations. Furthermore, surveys guarantee anonymity which is of importance in the present research area. Finally, sample members are quite flexible with regard to the processing of the questionnaire (Häder 2010). According to the candidate's point of view, these advantages outweigh the disadvantages. Nevertheless, it seemed advisable to carry out a pilot study for several reasons. First, to check the technical feasibility of the data collection process and second, to check the comprehensibility of the questions (Alemann 1984). This pretest was carried out during the literature review in September and October 2013. Pilot study members confirmed their participation during the research proposal stage. The pilot study was carried out on the level of the MBGs in Hesse and Schleswig-Holstein, as one pretest member finally denied to

participate. The pilot study of the present research verified the questionnaire, which was issued in both paper-based and online format. The pilot study members received per e-mail:

- the letter of invitation with university headings;
- the questionnaire instructions;
- the questionnaire;
- the feedback form.

The feedback form referred to the assessment of the invitation letter, the instructions and the questionnaire. Sending the questionnaire by e-mail seemed appropriate due to time constraints. The pilot study members were asked to send their feedback online or paper-based until 18 October 2013. Unfortunately, it was not possible to test the online version externally as this pilot study member finally denied to participate. The paper-based feedbacks from the MBG Hesse and the MBG Schleswig-Holstein were transformed manually into the online system. This process worked problem-free. Entry codes for questionnaire's online processing were not applied in order to guarantee as much anonymity as possible. The pilot study members confirmed the following:

- the invitation letter is comprehensive and meaningful;
- the instructions are comprehensive and meaningful;
- the questionnaire is logically structured;
- the questions are comprehensive;
- the scope of answer categories is sufficient.

The processing of the questionnaire took approx. 30 minutes and was still in the range of the reviewed examinations which required between 15 minutes (Kaufmann 2009; Grethe 2010) and 30 minutes (Reißig-Thust 2003; Kuckertz 2006). The pilot study members processed the questionnaires completely and did not recommend any changes with regard to the extent, the content and the wording. The application of the English language did not seem to be an issue. The pretest results confirmed the basic assumption that some of the variables along the investment process changed their significance during 2010, 2011 and 2012. Hence, the scales and indicators of the present questionnaire were regarded as suitable to depict developments in the PE and VC market. The questionnaire was accepted without amendments for the main study.

The main study was carried out immediately after the pilot study in order to reduce the risk of post-hoc recall biases. The main study was implemented between October 2013 and April 2014. In that respect, it was not supposed to achieve a similar response rate as in the case of the basic studies. These examinations each achieved impressing response proportions of approx. 50% (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). Due to the overload of survey-based research and the risk of non-response, the candidate supposed a response rate of approx. 25%. Response rates of the reviewed research studies vary between 9% (Kuckertz 2006) and 88% (Brinkrolf 2002; Vater 2002). Nevertheless, initial contacts with market members during the research proposal stage showed that the participation in very long surveys is overall denied. This explains the extent of the present questionnaire, which differs from the basic studies due to candidate's concerns regarding non-responses.

5.5.2 The sample frame of the survey

The present research study is concerned with Germany's PE and VC market during the post-crisis phase between 2010 and 2012. The focus of this dissertation is on early-stage and on smaller volume financing, as these areas due to their declining proportions since the millennium change were regarded as incomplete and support-worthy (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). In addition, this thesis is also concerned with public funding initiatives for equity financing purposes (see section 4.6.4) and therefore a research focus is also on the public and on the semi-public investors.

Initial reviews showed that detailed directories neither for the entire market nor regarding venture capitalists and public investors were available. Moreover, these reviews showed that a clear differentiation of venture capitalists which are exclusively concerned with early-stage financing in comparison to the entire market seems difficult. In the majority of cases, independent investors are concerned with early-stage investments and also with additional types of financing, for example expansion financing in order to compensate the higher default risk of early-stage investments. As a consequence, distortions with regard to the selection of venture capitalists were taken into account. The group of public and of semi-public investors on the other hand are concerned with rather every type of financing purpose due to their status as supporters. Therefore, the separation of public investors which are solely concerned with seed and start-up financing from the remaining public investors was neither reasonable nor desirable in order to avoid a too detailed picture of their investment behaviour, investment strategy and investment

process. Hence, this sample selection considered independent and corporate venture capitalists in the field of early-stage financing on the one hand and public and semi-public investors on the other hand. Semi-public investors in that respect are investors whose shareholder background is not necessarily composed of public authorities alone but regardless of their shareholders do not exclusively follow the aim of profit maximization. This applies for example for the so-called Mittelständische Beteiligungsgesellschaften which classify themselves as a self-helping institution for small and medium-sized enterprises (see section 4.2) or for public-private partnerships as in the case of the High-Tech Gründerfund in Bonn. In order to receive a comprehensive picture of these investors which were investment active in Germany during the post-crisis phase, the sample frame was based on a purposive selection.

With regard to public and semi-public investors, initial reviews showed that the public investment activities are realised on the federal level, the federal states level and on the local district level. The federal level in Germany coordinates the PE and VC investments on the level of the state-owned Kreditanstalt für Wiederaufbau, which does not directly participate in Germany's equity market but rather supports the entire market with several types of co- and refinancing measures (see section 4.5.1). As a consequence, the KfW has neither a specific internal division nor a daughter company for direct equity investment purposes. Nevertheless, the KfW is a co-investor of the so-called High-Tech Gründerfund (see glossary), which was launched after the millennium change to stimulate seed and start-up investments in Germany. The HTGF is part of the sample frame. The second state-owned bank on the federal level, the so-called Landwirtschaftliche Rentenbank, which is overall busy with agriculture investments (see section 4.5.1), is not involved in any kind of equity investments in Germany. With regard to the federal states level in Germany, the review showed that PE and VC investments are carried out and organised within the public investment bank (see glossary) sector too. In some cases, the public investment banks bundle their equity business in daughter companies, in some cases commission independent firms with the fund management or coordinate their equity investments over the respective MBG. In other cases, they coordinate their equity business over savings bank daughter companies in their respective homeland area. Moreover, public PE and VC investments on the federal states level are also realised over the so-called Landesbanken (see glossary). The review in that respect showed that four of the eight so-called Landesbanken were not involved in PE and VC investments at the moment of the sample selection in 2013. The remaining four federal state banks coordinate their equity investments in daughter companies, commission third

parties with the fund management or cooperate with the savings bank sector in their respective homeland area.

Basically, the selection of sample members was based on the membership data base of Germany's PE and VC association in Berlin. At the end of 2012, 187 PE and VC firms were full members of the BVK which supposed that additional 40 to 50 investors would be operating outside a BVK membership (see section 4.2). Therefore, additional directories were considered in order to receive a quite comprehensive picture of the market in accordance with the selection criteria. This was in particular required regarding venture capitalists in Germany. Hence, the directories of the Venture Capital Club in Munich, the chamber of commerce in Hamburg, the Munich Network e. V. as well as the directories on Gründungskatalog.de and Kontaktmakler.de were reviewed in greater detail. With regard to the public investors, the review considered every homepage of the public investment banks and of the federal state banks, the so-called Landesbanken. Detailed information regarding the PE and VC business on the level of the savings banks in Germany on the other hand could not be obtained from Germany's savings bank association. This part of the sample selection was therefore based on a directory in the dissertation of Kammlott (2004). This directory was reviewed in greater detail regarding its completeness and finally updated. The review showed that a major proportion of savings banks equity business was exclusively concerned with mezzanine financing. Savings banks divisions or savings bank daughter companies which were solely concerned with mezzanine financing or whose investment activities were comparatively small were not considered in the sample frame. On the other hand, the cooperative bank sector coordinates the PE and VC business over two daughter companies, which operate nationwide. One of these cooperative bank daughters was solely concerned with mezzanine financing and therefore not considered in the sample frame either. The 16 so-called Mittelständische Beteiligungsgesellschaften (see section 4.2) were considered in their entirety. The latter type of investor, the savings bank sector and the cooperative bank sector were classified as semi-public investors. In that context, it is specified that the cooperative bank sector is not solely concerned with profit realisation but also with the support of their cooperative members and small and medium-sized enterprises. Irrespective of their completely different shareholder structure, they follow comparatively similar objectives as the savings banks and are also regionally focused (see glossary). Thus, the cooperative bank sector in that research study was regarded as semi-public which corresponds with earlier research studies for example Achleitner et al. (2008).

PE and VC investors which were not investment active during 2010 to 2012, and hence were either concerned with the management of their portfolio, or which were founded after 2012, or whose investment activities were comparatively small, were not considered in the sample frame. Moreover, equity investors which were solely concerned with mezzanine financing were not considered either.

This selection procedure finally resulted in the purposive selection of both independent and corporate venture capitalists in the field of early-stage financing on the one hand and public and semi-public investors on the other hand. Hence, this sample frame composition depicted the market in the incomplete segment of early-stage financing on the one hand but at the same time considered public and semi-public investors' involvement on the other hand. Even though the selection process was carried out in greater detail and in several runs, it could not be ensured that this sample frame was a full representation of early-stage and of public investors in Germany. Therefore, this sample frame did not allow for inferences regarding the entire PE and VC market nor regarding early-stage or public investors.

The sample frame is detailed in the subsequent table 22 and an overview of the sample members is enclosed in appendix L.1 (see table 23).

The sample frame classification		
Type of investor	Number	Proportion
Independent investor	39	37%
Corporate Venture Capitalist	8	7%
Mittelständische Beteiligungsgesellschaft	15	14%
Savings/Cooperative/Public bank daughter	39	36%
Public investor	6	6%
Total sample	**107**	**100%**

Table 22 The sample frame classification (own development)

Regardless of the purposive sample selection and the overrepresentation of the public and semi-public investors in the sample frame, this sample frame composition seemed suitable to describe market developments in the areas of early-stage financing and of public equity investors. Moreover, this sample frame composition allowed for separate and detailed descriptions regarding the so-called Mittelständische Beteiligungsgesellschaften and for comparison analyses

between the group of public and semi-public investors on the one hand and the more strategic and profit-oriented investors on the other hand.

Overall, this sample frame represented 57% of the BVK members in 2012 and 46% of the estimated market in Germany respectively. The number of public and semi-public investors on the other hand represented a proportion of 32% from the BVK memberships in 2012 and a proportion of 26% from the estimated market in Germany respectively. These proportions seemed to represent the vast majority of both public and of semi-public investors in Germany, at least on the federal level and on the federal states level. In comparison, Schilder (2006), who was earlier research active with regard to public investors in Germany too, classified 45 investors from 187 BVK members as public investors in 2005. This represented a proportion of 24% from the entire BVK memberships.

5.5.3 The data analysis of the survey results

At this point it is repeated that the present study builds on the cross-sectional studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010), who were concerned with the descriptive analysis of developments in Germany's PE and VC market between 1999 and 2009 (see section 4.3). In that context, the present study also considers the descriptive research study of Hummel (2011b) regarding the developments in Germany's PE and VC market during the initial crisis phase of 2008 and 2009. In order to analyse the German PE and VC market during the post-crisis phase with regard to market members' investment strategy, investment behaviour and the changes along the investment process, the questionnaire of the present thesis (see appendix F.1) is based on and derived from the studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010) (see table 19 in appendix E.1; see table 20 in appendix E.2; see table 21 in appendix E.3). These studies were analysed by means of descriptive statistics. The present study was analysed by means of descriptive statistics too in order to ensure research continuity and comparability in accordance with the recommendations of Alemann (1984).

The investment strategy of investors in the present research study is derived from the financing purpose, the type of equity investment, the investment classes and the consideration of industry branches (see section 4.6.4 objective 3 a). For analysis purposes, frequencies and proportions were calculated on the level of the financing purpose, the type of equity investment, the

investment classes, the progress of investment classes and the consideration of industry branches.

The investment behaviour of market members is derived from the application of public funding, the proportion of syndication in relation to the number of investments, the investment proportion in relation to received business plans, the total fund volume, the total investment volume, the number of investments and the number of portfolio companies (see section 4.6.4 objective 3 b). In that respect, the application of public funding is associated with the calculation of frequencies and proportions, whereas the investment proportion in relation to received business plans is associated with the calculation of means, medians and deviations. With regard to the total fund volume, the total investment volume, the number of investments, the number of portfolio companies and the proportion of syndicated investments, each the minimum and maximum values, the ranges, the medians, the means and the deviations were calculated.

Finally, changes along the investment process during the post-crisis phase were analysed along the deal sources, the deal screening, the phase of negotiation and contracting, and the post-investment phase with portfolio company's monitoring and mentoring, and investor's exit (see section 4.6.4 objective 3 c). The analysis regarding the development of deal sources is associated with the calculation of ranks. The assessment regarding the relevance of business plan, due diligence and mentoring components, which are each captured on a five-point scale, is associated with the calculation of means, deviations and ranks. Survey responses regarding business plans' and due diligence components' relevance during the post-crisis phase are captured along a three-point scale in order to determine whether components' relevance increased, remained unchanged or decreased. Survey responses regarding the monitoring and mentoring extent during the post-crisis phase are captured along a three-point scale too in order to determine whether the degree of investors involvement increased, remained unchanged or decreased. The proportion of break-off reasons and of exit channels are associated with the calculation of means, medians and deviations. In addition, possible effects both of the Basel III implementation and the transformation of the AIFM-directive are associated with the calculation of proportions and frequencies. The results are presented in tabular form and are interpreted accordingly. This analysis procedure seemed appropriate in order to ensure research continuity and comparability in accordance with the recommendations of Alemann (1984) and with respect to the basic studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). These research studies and the study of Hummel (2011b) are completely descriptive in character.

The subsequent sections detail the qualitative part of the analysis and at first present the basic analysis procedure of the qualitative text analysis.

5.6 The qualitative part of the examination

According to the research objectives (see section 4.6.4), the qualitative part of the examination was required in order to analyse:

- Germany's economic and innovation political strategy;
- the progress of public funding on the federal level;
- the investment process, the AIFM-directive and Basel III.

This part of the examination is based on a purposive selection of publications which were analysed by means of qualitative content analysis. In that respect, Mayring (2010) points out that qualitative content analyses are rather flexible in their application and are aligned on the specific research topic. Mayring (2010) refers to following basic procedure of a qualitative content analysis (see subsequent table 24).

The basic procedure of the content analysis	
No.	Process step and clarification
1.	Selection of the material base: Presentation of the sample frame.
2.	Material description: Author, intention, target group.
3.	Classification of the text material: Interview protocols, books, articles, etc.
4.	Clarification of the basic analysis objective: E. g. description of a specific subject, emotional condition of the author, effects on reader.
5.	Theoretical justified questions regarding the text content: Research question or subject that has to be addressed by the content analysis.
6.	Specification of the text analysis method: Summary, explication, structuring.

7.	Development and clarification of the category system: Categories refer to sections, sentences or phrases.
8.	Code unit and context unit: Definition of the smallest and the biggest analysis pieces.
9.	Analysis of the text material: Application of the category system and its refinement.
10.	Results summary: Interpretation along the research question.
11.	Model goodness: Reliability and validity check.

Table 24 The basic procedure of the content analysis (derived from Mayring 2010, p. 60)

Basically, Mayring (2010) distinguishes between text summary, text explication and text structuring. These analysis procedures are applied in isolation or in combination. Summaries are the reduction of text material by the exclusion, the selection, the integration and generalisation of specific text phrases. This summary process is moving from a more individual and detailed perspective to a finally more generalised summary of text phrases on higher abstraction levels. On the other hand, the so-called inductive summaries are the exploratory development of categories by open coding along a specific research question. The text material is analysed up to a point at which an exhaustive number of categories seemed to be developed. These categories are subsequently applied on the whole text material and have to be adjusted during the further analysis process (Mayring 2010). Beside the inductive analysis of the text material, category systems are also derived from existing theories. Overall, category systems are open to adjustments during the analysis process in case they are not exhaustive or applicable (Kempf 2008). Explication on the other hand is the explanation of incomprehensible text phrases. In that case, unclear text phrases are explained by simple encyclopedia-based explanations, by their text environment or by additional text material. The final type of content analysis according to Mayring (2010) is structuring. He distinguishes between text structuring according to linguistic, thematic or semantic criteria. Moreover, Mayring (2010) distinguishes between structuring in relation to specific cases or typical dimensions, and structuring along the assessment on scales.

These clarifications regarding content analyses are not conclusive but are regarded as suitable to describe the content analysis process of the present thesis. Hence, the subsequent sections

regarding the sample selection and the final analysis process are clarified in the context of the basic process model of Mayring (2010).

5.6.1 The sample frames of the content analysis

The subsequent clarifications are based on the basic procedure of the content analysis and therefore are initially concerned with points one to five (see table 24 in section 5.6).

The examination areas of the present thesis were examined out of a neo-institutional theoretical perspective. The existence of the PE and VC market and the issue of public funding were embedded in this theoretical framework (see sections 3.3, 3.3.1, 3.3.2 and table nine in section 3.3.2). A basic theory, a research question and a research aim and research objectives were derived from the developments in Germany's economy, Germany's PE and VC market and from the application of public funding measures (see sections 4.6.3 and 4.6.4). The research aim and objectives encompass the following research subjects which were also addressed by a purposive selection of publications.

The subsequent table 25 details the respective research subject and the relevant publication base.

The research subjects and the literature base	
Research subject	Literature base
1. Germany's economic and innovation policy.	BMWi reports; BMBF reports.
2. Research subsidies KMU-innovativ and ZIM; public funding measures for SME investments, innovation projects, enterprise founding and equity investments on the federal level.	KfW reports; KfW support reports; BMWi/BMBF reports.
3. Additional insights regarding the investment process, the AIFM-directive and Basel III.	BVK publications.

Table 25 The research subjects and the literature base (own development)

With regard to the German economic policy, the German government is obliged to submit an annual economic report. This report is published by the federal department for economic and energy. The present analysis is based on the federal reports of 2011, 2012 and 2013 (BMWi 2011; BMWi 2012; BMWi 2013). These reports are sub-divided in two different chapters and an additional appendix. In the first parts of the reports, the German government comments on the economic development and economic political measures during the previous year. In addition, the government presents the future economic policy and annotates the opinion results from German's council of economic experts. In part two of the economic reports, the government estimates the future economic development of the current year. This part two also presents a comparison of the governmental forecast for the previous year and the final economic outcome. The appendices of the reports each list legislation, legislative projects and initiatives of Germany's government in the current year. These reports, which were completely available online, were required to examine the progress of Germany's economic and public funding policy on the federal level.

The subsequent table 26 details the structure and the content of the present economic reports.

The content of the economic reports			
Title	BMWi report 2011	BMWi report 2012	BMWi report 2013
Publisher	BMWi Berlin	BMWi Berlin	BMWi Berlin
Publishing date	January 2011	January 2012	January 2013
Number of pages	98	101	114
Content of part I	Annual economic report 2010/2011	Annual economic report 2011/2012	Annual economic report 2012/2013
Content of part II	Governmental prediction for 2011	Governmental prediction for 2012	Governmental prediction for 2013
Appendix	Governmental measures: 104	Governmental measures: 117	Governmental measures: 132

Table 26 The content of the economic reports (BMWi 2011; BMWi 2012; BMWi 2013)

With regard to innovation policy, the federal department for education and research publishes a comprehensive research and innovation report every two years. The analysis is based on the content of the research reports 2012 (BMBF 2012) and 2014 (BMBF 2014), which refer to the

timeframe of the post-crisis phase from 2010 to 2012. The reports are each sub-divided into three chapters. The first chapter describes the research and innovation policy of Germany's government. This encompasses specific research, innovation and educational political measures on the national and international level. The second chapter of the reports describes the structure of the German research system and details the research and innovation policy each on the federal and federal states level. In addition, this chapter details the international research cooperation and presents data regarding research resources, publications, patents and the economic contribution of innovations in Germany. This second chapter also details public subsidies and public funding measures for research and development, for enterprise founding and innovation advisory. These reports were required to examine the progress of Germany's innovation policy and public funding on the federal level. The reports were completely available online too.

The subsequent table 27 presents the structure and the content of the underlying research reports.

The content of the research reports		
Title	Research report 2012	Research report 2014
Publisher	BMBF Berlin/Bonn	BMBF Berlin/Bonn
Publishing date	2012	2014
Number of pages	656	722
Content of part I	Research and innovation political objectives and measures.	
Content of part II	Structure, resources and support measures of the German innovation system.	
Sections	A. Structure of the German research and innovation system.	
	B. Research and innovation policy of the federal government.	
	C. Research and innovation policy in the federal states.	
	D. International research cooperation.	
	E. Facts and figures regarding the German research and innovation system.	
Content of part III	Appendix: Overview of research institutions in Germany.	

Table 27 The content of the research reports (BMBF 2012; BMBF 2014)

The analysis on the level of the KfW is based on the KfW reports of 2010, 2011 and 2012 (KfW 2011; KfW 2012; KfW 2013), and the KfW support reports of 2010, 2011 and 2012 (KfW 2011a; KfW 2012a; KfW 2013a). The annual reports of the KfW are sub-divided along business units. The category funding in Germany is associated with different business units. The first one is the so-called KfW-Mittelstandsbank which is focused on the financing of SMEs. The second one is the so-called KfW-Privatkundenbank which is focused on the financing of private households. The third one is the so-called KfW-Kommunalbank which is concerned with the

financing of local districts. The final business unit is the division of capital market securitisation. The present analysis is focused on the business unit of the KfW-Mittelstandsbank which provides funding programmes for SMEs, innovation projects, enterprise founding, equity investments and environmentalism projects.

The subsequent table 28 details the structure and the content of the KfW annual reports for 2010, 2011 and 2012.

The content of the KfW annual reports			
Title	KfW annual reports		
Year	2010	2011	2012
Publisher	KfW Frankfurt/Main	KfW Frankfurt/Main	KfW Frankfurt/Main
Publishing date	2011	2012	2013
Number of pages	136	127	126
Content	Key figures.		
	Letter of the board of directors.		
	Funding in Germany:		
	Business unit KfW Mittelstandsbank;		
	Business unit KfW Privatkundenbank;		
	Business unit KfW Kommunalbank.		
	Securitisation.		
	Sales.		
	Export and project financing.		
	Funding in developing countries.		
	Capital markets.		
	Additional business services (only in report 2010).		
	Staff resources.		
	Financial statement.		
	Corporate governance.		

Table 28 The content of the KfW annual reports (KfW 2011; KfW 2012; KfW 2013)

The support reports of the KfW (KfW 2011a; KfW 2012a; KfW 2013a) supplement the analysis of the annual reports (KfW 2011; KfW 2012; KfW 2013). The support reports present the information of the annual reports in greater detail, contain time series comparisons and detail the volume of the funding programmes down to the federal state and local district area. The initial analysis in section 4.5.2 showed that the analysis of the KfW programmes requires a detailed examination, as the programmes partly overlap and sometimes are discontinued or reintegrated in other programmes. This makes it difficult to analyse the progress of the programmes according to strict programme structures.

The subsequent table 29 details the structure and the content of the KfW support reports.

The content of the KfW support reports			
Title	KfW support reports		
Year	2010	2011	2012
Publisher	KfW Frankfurt/Main	KfW Frankfurt/Main	KfW Frankfurt/Main
Publishing date	2011	2012	2013
Number of pages	694	676	705
Basic content	KfW funding volume on programme level.		
	Detailed reports on federal state's level.		
	Detailed reports on local district's level.		
	Specification regarding the calculation method.		

Table 29 The content of the KfW support reports (KfW 2011a; KfW 2012a; KfW 2013a)

These reports were required to examine the progress of public funding programmes for enterprise financing, innovation financing, enterprise founding and equity financing on the KfW level. The reports were completely available online.

The sample frame for the third part of the text analysis is based on a purposive selection of publications from the BVK which were published during 2010, 2011 and 2012. This procedure was required to expand the results along the subjects investment process, AIFM-directive and Basel III. This included publications which were available online on BVK's homepage and were listed under the following headings:

- annual reports in the section BVK;
- market information for investors in the section facts and figures;
- press releases in the section press releases;
- private equity letters in the section publications.

The BVK publications were initially reviewed regarding their meaningfulness for the present research. This procedure finally resulted in a purposive selection of publications which are listed in table 30 (see appendix L.2). This publication base was analysed with different content analysis procedures. These procedures are described in greater detail in the subsequent sections.

5.6.2 The process of the content analysis

The subsequent clarifications refer to points six to 11 (see table 24 in section 5.6) in the basic content analysis model of Mayring (2010). At first, the subsequent section is concerned with the content analysis process of the annual economic reports. The following sections then describe the analysis processes of the research reports, the KfW annual reports and finally of the BVK publications.

5.6.3 The analysis of the annual economic reports

The analysis of the annual economic reports was required in order to examine Germany's economic and innovation policy during 2010, 2011 and 2012. This also encompassed every type of public funding initiative on the federal level for SME investments, innovation projects, enterprise founding, equity financing and, furthermore, the research subsidies ZIM and KMU-innovativ (see table 25 in section 5.6.1).

In order to understand this part of the analysis, several theoretical aspects must be considered. The issue of the PE and VC market has already been embedded in a neo-institutional perspective, which was also regarded as suitable to describe and to explain the issue of public funding (see section 3.3). Economic policy and innovation policy are treated separately and therefore the unquestioned application of a neo-institutional theoretical framework seemed inappropriate. In order to describe and to explain the economic and innovation policy, and in order to operationalise the analysis process, an alternative theoretical framework was required. In that regard, the subsequent paragraphs are concerned with theoretical clarifications of both economic and innovation policy, and the development of a theoretical foundation. This section finally details the application of the theoretical framework of the present examination.

In order to comprehend the specific subjects of economic policy, this initially requires the differentiation between a theory of economic policy and an economic theory. The latter is focused on the description of the economy and is the basis for the theory of economic policy. The theory of economic policy in the majority of directions tries to infer normative recommendations about a desired state. Hence, the theoretical part of economic policy, which is focused on the current economic political status quo, transforms the theoretical results into recommendations for practice. On the other hand, economic political theorisation is also

concerned with the description of the current state in order to infer future behaviours of decision makers (Neck and Schneider 2013). The present thesis is neither concerned with the assessment of the current political measures, the inference of normative recommendations nor with future projections. This thesis is solely concerned with the description of economic policy during the financial crisis. The procedure in that respect resulted in the inference of Germany's political strategy in relation to existing economic political theories. Therefore, both a suitable analysis framework and a category system were required in order to select economic political measures and to derive the final strategy of the government. This basic framework was aligned on the specific subjects of economic policy (Neck and Schneider 2013).

Economic policy by definition is every measure in order to structure, to navigate and to organise an economy (Wildmann 2012). In terms of a functional structure, economic policy is concerned with governance measures and thus regulatory policy, process policy and structural policy (Neck and Schneider 2013). Regulatory policy by definition establishes the framework for economies and in free market economies, regulatory policy is always concerned with competition policy. Process policy on the other hand is the direct application of specific measures to align the economy on growth. Finally, structural policy is concerned with the support of specific sectors or regions (Wildmann 2012).

This basic structure is surely to broad in order to derive a specific type of economic policy, which is considered as multi-paradigmatic sciences with different theoretical orientations (Neck and Schneider 2013). Neck and Schneider (2013, p. 50) in that context point out that it would be overall difficult to structure economic policy, not only with regard to its functions, but also with regard to its instruments and objectives.

A less abstract but more detailed dimension according to Wildmann (2012) is focused on the following subjects:

- conjuncture policy;
- distribution policy;
- employment policy;
- environmental policy;
- foreign trade policy;
- finance policy;

- monetary policy;
- social policy.

Even though this categorisation system suffers from overlaps too, it seemed suitable as a foundation for an analysis framework. The subjects of employment policy, foreign trade policy, distribution policy, environmental policy and social policy were excluded in the present examination even though some of their aspects overlap with regard to conjuncture policy. The remaining subjects of monetary, conjuncture and finance policy were applied on the examination material. This means that laws, law initiatives or other campaigns and promotions on the federal level which came into force or were proposed during the post-crisis phase were analysed in accordance with monetary, conjuncture and finance policy in Germany. This examination was focused on the most important political initiatives which required the subjective differentiation from the less important political initiatives.

Regarding the institutional level, economic political decision making is realised by public and hence state institutions. In accordance with Germany's federal system, political decision making is realised by the governments, the parliaments and the courts, each on the federal level, the federal states level and the local district level. This perspective on public institutions encompasses every public organisation which supports the political decision making process or which is directly responsible for political decision making. The public decision making process is supported by private organisations such as employer's associations or unions. Moreover, public subsidised economic research institutions participate in the decision making process. Nevertheless, they are not classified as authorised public decision makers (Wildmann 2012). The present examination is solely focused on the federal level of public decision making. This perspective encompasses the supranational level (Wildmann 2012) and in that respect the European level.

The subsequent figure two summarises this basic analysis framework regarding the economic policy in Germany.

1. Examination perspective:
    a) political decision making in Europe;
    b) political decision making in Germany.
2. Analysis areas:
    a) monetary policy;
    b) conjuncture and growth policy;
    c) finance policy.
3. Governmental measures:
    a) laws;
    b) law initiatives;
    c) promotions.

Figure 2 The basic analysis framework (own development)

This framework (see figure two) is not derived from a specific theoretical perspective but rather from the subjects of economic policy. Hence, this part of the examination was not carried out in relation to a specific theoretical lens, for example Keynesianism, Monetarism or the Neoclassic. This part of the examination rather went the opposite direction in order to determine the specific type of economic theory behind the economic policy during the financial crisis.

The innovation political strategy on the other hand was examined according to Schumpeter's conjuncture theory, which argues that both invention and innovation would be required for further economical progress (Wildmann 2012 and section 2.6.1). Therefore, the issue of innovation policy was examined in the context of economic policy during the financial crisis. As the specification of the innovation policy is mainly derived from the research reports, the description of innovation political concepts is realised in the subsequent section 5.6.4.

Due to the focus on the central elements of Germany's economic and innovation policy, an exploratory summary or the inductive category development according to Mayring (2010) seemed inappropriate. Therefore, the material was analysed according to rather open examination areas which were derived from the framework in figure two. Text phrases which addressed the respective examination area were finally summarised according to each examination field. This procedure is defined as a structured content analysis according to Mayring (2010).

The analysis of the economic reports was focused on their summary section in part one and on the appendix of each report. The summary of the reports describes the past economic development, presents the governmental forecast, the past legislation and the future intentions of the government. Part one of the reports is sub-divided into several sections which are for instance concerned with economic, competition or financial political measures. These sections are structured along consecutively numbered paragraphs which are each focused on a particular sub-issue along the main topics. Part one of the economic reports includes additional clarifications with regard to specific incidents, legislations or other initiatives both on the European and German level. These clarifications, beside additional statistical indications, are integrated in colour-coded boxes. Part two of the reports, which presents the economic forecast of the government, was not part of the present analysis. The appendices of the economic reports each schedule legislative initiatives, the legislation of the underlying year and other promotions or deed polls on the federal level (BMWi 2011; BMWi 2012; BMWi 2013).

With regard to the development of a category system, it was avoided to apply a narrowed classification. Therefore, the text material was initially analysed roughly along the so-called guiding questions (Kempf 2008). A more detailed category system according to the guiding questions was then applied along the summarised text material. If required and appropriate, the category system was adjusted during several examination runs (Kempf 2008; Mayring 2010). The smallest code unit in the text was one paragraph and the biggest code unit was one numbered text section. A text section consists of at least one or in some cases of several paragraphs, whereas one paragraph consists of several sentences. Coding each sentence seemed inappropriate, as the explanation of a particular subject is associated with at least one paragraph. The indications in the colour-coded boxes were also coded along the category system. In addition, the statistical information in the tables, the indications in the diagrammes and in the figures were considered too in the case the content contributed to the subject area.

The basic guiding questions are presented in the subsequent table 31.

The guiding questions for the economic reports		
No.	Guiding question	Code
1.	Indications regarding European economic policy?	01
2.	Indications regarding economic policy in Germany?	02
3.	Indications regarding public funding in Germany?	03

Table 31 The guiding questions for the economic reports (own development)

Text sections which addressed the specific guiding question were coded and finally summarised under each subject. This procedure allowed for a further detailed classification of the text content along following category system (see subsequent table 32).

The category system for the economic reports		
No.	Examination category	Code
1.	European economic policy.	01A
2.	European finance, conjuncture and monetary policy.	01B
3.	European innovation policy.	01C
4.	German economic policy.	02A
5.	German finance, conjuncture and monetary policy.	02B
6.	German innovation policy.	02C
7.	Public funding in Germany for SMEs.	03A
8.	Public funding in Germany for innovation projects.	03B
9.	Research subsidy ZIM.	03C
10.	Research subsidy KMU-innovativ.	03D
11.	Public funding in Germany for enterprise founding.	03E
12.	Public funding in Germany for equity investments.	03F

Table 32 The category system for the economic reports (own development)

The following examples (see subsequent table 33) describe the application of the category system along part one of the economic report 2011 (BMWi 2011).

Example I of category systems application		
Paragraph	Subject of the numbered paragraph in part one	Code
23	Germany's dynamic economic growth.	-
26	Germany's dependence on the world economy.	-
28	Economic political strategies after the crisis.	02A
46	Public household consolidation in Germany.	02B
48	Germany's future agreement.	02B
50	Reorganisation of local districts financing.	-

Table 33 Example I of category systems application (own development)

The more detailed coded text phrases were finally summarised under each category according to the summary procedure of Mayring (2010). This, inter alia, means that non relevant sentences or double indications were deleted and unclear text phrases were explicated. The category system was finally applied on the additional indications in the colour-coded boxes, the tables and the diagrammes. This process is described in the subsequent example (see subsequent table 34) which is based on the content of the economic report 2011 too (BMWi 2011).

Example II of category systems application		
Box no.	Subject of the text element	Code
2	Causes, effects and perspectives of Germany's export.	-
4	Implementation of the future agreement in the public budget law 2011.	02B
7	Core objectives of the European-2020-Strategy and national aims.	01A
	Core objectives of the European-2020-Strategy and national aims.	02A

Table 34 Example II of category systems application (own development)

The results of these analyses were integrated in the summary, in case this expanded the initial findings. Finally, the analysis was concerned with the governmental measures in the appendix of the economic reports. The measures are consecutively numbered and hence the smallest and also the biggest code unit were each one specific governmental measure. The measures were also coded along the category system in table 32. Governmental measures which are concerned with the development of Germany's eastern part, development political measures, the funding of enterprise founding in the scientific environment and every type of advisory grant were overall not taken into account. The subsequent table 35 describes the application of the category system along the governmental measures in the appendix of the economic report 2011 (BMWi 2011).

Example III of category systems application		
No.	Governmental measure	Code
2	Qualification during short-time employment.	-
7	Adjustment of the tobacco tax.	-
20	Adjustment of the company law.	-
25	European-2020-Strategy.	01A
70	Prolongation of the agreement for research and innovation.	02C
72	Modification of the research subsidy ZIM.	03C
73	Modification of the research subsidy KMU-innovativ.	03D
76	Germany's digital strategy 2015.	02C
88	Energy efficiency fund.	RC
98	Innovation alliance photovoltaic.	02C

Table 35 Example III of category systems application (own development)

The coded initiatives were finally summarised along the categories and integrated in the initial analysis of the economic reports. Governmental measures in the residual category, which were classified as RC, were reviewed in greater detail by means of explication (Mayring 2010). In case that their final classification was not possible or appropriate due to a minor relevance, these measures were excluded from the examination. The selected measures were scheduled, which included a brief description.

The final results are presented for each economic report in an annual sequence. In order to achieve a fluent transition between the initial phase of the financial crisis and the post-crisis phase, the analysis started with the review of the economic report 2010 (BMWi 2010).

5.6.4 The analysis of the research reports

The analysis of the research reports 2012 (BMBF 2012) and 2014 (BMBF 2014) was focused on Germany's research, education and innovation policy during the post-crisis phase. According to the literature review results, it seemed advisable to examine the research, the education and the innovation policy also in the context of European initiatives and long-term developments. The initial literature review in that context showed that one of the most important subjects of innovation policy in Germany is associated with the introduction of the so-called Hightech-Strategy in 2006. This innovation strategy was modified in 2010, and thus at the beginning of the post-crisis phase (see section 4.5). This part of the text analysis was therefore focused on

changes in Germany's innovation policy during the post-crisis phase, and the specification of the respective innovation policy.

In order to classify the specific type of innovation policy, the literature refers to different innovation political concepts. In that context, the core concepts behind innovation policy are the so-called market-based innovation policy on the one hand and the intervention-based innovation policy on the other hand. The main difference of these concepts is the more restrained strategy in the case of market related policy and the more on influence and involvement focused strategy of intervention-based policy. The latter concept is based on the assumption that innovation processes would be variable and flexible. Therefore, innovation processes could be aligned on society's needs by means of an active innovation policy. This concept applies both hard and soft instruments of innovation political measures to increase society's welfare and to settle disadvantages. Moreover, this concept follows more long-term aims whose achievement are supported by methods of technical progress and effect analyses. The market related concept is based on the assumption that innovation processes would be dependent on market's demand and profitability decisions. Therefore, innovation is regarded as not controllable and political instruments are applied to ensure a positive innovation climate, to support the technology transfer, and the expansion of both technical and scientific infrastructure. Even though this concept basically relies on market mechanisms, it is also concerned with the public support of basic research due to existing market gaps. Nevertheless, innovation political instruments (see glossary) are only applied from time to time and in dependence on market requirements. Therefore, technical progress and effect analyses are of rather no relevance, as is the achievement of consensus between policy decision makers and the society (Welsch 2005).

The underlying research reports 2012 (BMBF 2012) and 2014 (BMBF 2014) are each structured in three different parts. Part two of the research reports is, moreover, divided into different sub-parts (see table 27 in section 5.6.1). In order to examine the development and changes in Germany's research and innovation policy, this part of the content analysis was each focused on part one regarding the innovation political aims and measures of the government. Moreover, the analysis was focused on part two and sub-part B regarding the research and innovation policy on the federal level. This sub-part B also includes a separate section regarding technology funding on the federal level. Hence, sub-part A, C and D in part two and also part three of the reports were not examined. The facts and figures in sub-part E of chapter two were taken into account in case the indications support the analysis process.

The analysis was initially based on the following guiding questions (see subsequent table 36) in order to structure the text in a first attempt (Kempf 2008).

The guiding questions for the research reports		
No.	Guiding question	Code
1.	Indications regarding research, education and innovation policy?	01
2.	Indications regarding the Hightech-Strategy?	02
3.	Indications regarding public funding in Germany?	03

Table 36 The guiding questions for the research reports (own development)

This procedure initially structured the text along these main subjects. Due to the extent of the research reports, the analysis was supported by the application of Adobe reader's search function. The more sophisticated search function of the Adobe reader was suitable to highlight the relevant text phrases in the context of each subject. These highlighted text phrases were coded along the guiding questions (see table 36) and summarised under each question. The smallest code unit was one paragraph and the biggest code unit was one text section. The initial summary was further reviewed along a more detailed category system (see subsequent table 37).

The category system for the research reports		
No.	Examination category	Code
1.	Central research, education and innovation political measures.	01
2.	Priorities of Germany's research, education and innovation policy.	02A
3.	Core elements of the Hightech-Strategy 2020.	02B
4.	Public funding in Germany for SMEs.	03A
5.	Public funding in Germany for innovation projects.	03B
6.	Research subsidy ZIM.	03C
7.	Research subsidy KMU-innovativ.	03D
8.	Public funding in Germany for enterprise founding.	03E
9.	Public funding in Germany for equity investments.	03F

Table 37 The category system for the research reports (own development)

The coded text phrases were summarised according to Mayring (2010) which means that double indications and meaningless text phrases were deleted. Unclear text phrases or particular terms were specified in greater detail by explication. The indications in the tables, the diagrammes, the figures and in the colour-coded boxes were also coded along the category system. These

indications were integrated in the summary, in case they supplemented the initial findings. Funding measures which are concerned with Germany's eastern part, development political measures, the funding of enterprise founding in the scientific environment and every type of advisory grant were overall not taken into account.

The subsequent table 38 describes the application of the category system on part one in the research report 2012 (BMBF 2012).

Example IV of category systems application				
Section	Extent	Page	Subject	Code
Section 1	Paragraph 5	22	Four research and innovation priorities.	02A
Section 2	Figure 4	23	The Hightech-Strategy: Future projects and demand.	02B
Section 2	Sub-heading	24	Future projects.	02B
Section 2	Infobox	24+25	Future projects of the government.	02B
Section 3	Section	32+34	Strengthening sciences.	02A
Section 3	Infobox	33	The three reform initiatives.	02A

Table 38 Example IV of category systems application (own development)

5.6.5 The analysis of the reports from the Kreditanstalt für Wiederaufbau

The examination of the KfW reports 2010, 2011 and 2012 (KfW 2011; KfW 2012; KfW 2013) was carried out in connection with the KfW support reports 2010, 2011 and 2012 (KfW 2011a; KfW 2012a; KfW 2013a). The analysis was required in order to examine the progress of the funding programmes for enterprise financing, innovation financing, enterprise founding and equity financing on the federal level. The analysis of the KfW reports was focused on the business unit KfW-Mittelstandsbank which details the progress of funding programmes during the financial year. This section is structured in paragraphs which are each concerned with the progress of a specific programme. The section KfW-Mittelstandsbank also presents the funding volume of each programme in comparison to the preceding financial year. These tables contain a brief description of each funding programme (KfW 2011; KfW 2012; KfW 2013).

The direct application of a category system was possible due to the rather small proportion of the underlying analysis pages and the clear structure of the content. The categories referred to funding of enterprises, innovation projects, enterprise founding and equity investments. An additional category is associated with KfW's co-investments for enterprise financing, enterprise

founding and equity financing which are initiated outside the KfW business. The smallest code unit was one sentence and the biggest code unit was one paragraph. The subsequent table 39 presents the category system for the analysis of the KfW annual reports.

The category system for the KfW reports		
No.	Examination category	Code
1.	Public funding for enterprise financing.	03A
2.	Public funding for innovation projects.	03B
3.	Public funding for enterprise founding.	03E
4.	Public funding for equity investments.	03F
5.	Co-investments outside the KfW business.	03G

Table 39 The category system for the KfW reports (own development)

The text content of the business area KfW-Mittelstandsbank was coded along the category system in table 39. The coded text phrases were then summarised according to Mayring (2010). Specific terms or unclear text phrases were further specified by means of explication. This part of the KfW analysis was supported by the additional analysis of the KfW annual support reports (KfW 2011a; KfW 2012a; KfW 2013a).

The volumes of the funding programmes which are provided by the KfW-Mittelstandsbank are presented along the following categories in the support reports:

- enterprise founding and SME financing;
- innovation financing;
- environmental project financing.

In a first step and in order to supplement the results from the literature review (see table 18 in section 4.5.2), the KfW support reports were reclassified along the following categories:

- enterprise founding and SME financing;
- innovation financing;
- equity financing;
- financial crisis related measures.

This procedure finally delivered a detailed overview regarding the progress of the funding programmes between 2008 and 2012. In a second step, equity financing measures of the KfW were further specified and their structure and purpose was described for each programme. Funding measures on the federal level which were initiated outside the KfW business were integrated in that presentation. Hence, this examination detailed the funding volumes for both the standard and for the equity financing programmes.

5.6.6 The content analysis of the BVK publications

The analysis of the BVK publications was carried out in order to expand the results regarding the investment process, the AIFM-directive and Basel III (see table 25 in section 5.6.1). This examination based on the following category system (see subsequent table 40).

The category system for the BVK publications				
No.	Category	Sub-category	Code	
1.	Financial market regulation	AIFM-directive	01	01A
		Basel III		01B
2.	Investment process	Deal flow	02	02A
		Deal screening		02B
		Negotiation		02C
		Contracting		02D
		Monitoring		02E
		Mentoring		02F
		Exit		02G
3.	Residual category		03	-

Table 40 The category system for the BVK publications (own development)

The underlying text material (see appendix L.2) was available both in MS-Word and, in some cases, also in PDF-format. Therefore, the examination was supported by the search functions of the Adobe reader on the one hand and MS-Word on the other the hand. The highlighted sections were coded along the category system in table 40. Results outside this category system which stand in the context of the present research were summarised in the residual category. The smallest code unit was one sentence and the biggest code unit was one paragraph. The coded text phrases were summarised along the category system. Irrelevant text phrases and multiple indications were deleted. The results were regarded as an expansion of the survey outcomes and therefore are presented in the context of the survey results. The category system of each content

analysis was applied in several runs and modified in case that the individual results differed significantly. The repeated application of the category system was also required in order to determine the reliability of the examination.

Nevertheless, smaller differences of the results which are achieved by the same encoder are regarded as normal. Objectivity on the other hand is determined by category system's application from different encoders. The results are then compared regarding their correlation (Mayring 2010). Objectivity is not guaranteed as the candidate had no additional researcher resources. Even though this part of the examination is surely rather subjective, the analysis processes and the results should be comprehensible. This part of the research should also be valid due to the scope of the analyses and the research objectives.

5.7 The validation study and research timeframe

Two validation studies were finally carried out in order to verify the results from the structured survey. Both validation studies focused on the developments along the investment process and were concerned with the deal flow, the screening of business plans, the due diligence, and monitoring and mentoring. The validation studies were also concerned with the results regarding Basel III and the AIFM-directive (see main study questionnaire part III and part IV in appendix F.1). The validation studies each based on structured questionnaires. In the first validation study, the questionnaire was sent both by mail and by e-mail to a purposive selection of sample members. This sample frame was derived from the main study sample frame (see section 5.5.2 and appendix L.1) without those sample members who refused to participate in surveys during the main study or already participated in the main study. This sample selection resulted in a purposive selection of 37 PE and VC firms in Germany. The subsequent table 41 details the sample frame of the validation study in comparison to the main study sample frame.

The sample frame compositions				
Type of sample	Main study		Validation study	
Type of investor	Number	Proportion	Number	Proportion
Independent investor	39	37%	10	27%
Corporate Venture Capitalist	8	7%	3	8%
Mittelständische Beteiligungsgesellschaft	15	14%	7	19%
Savings/Cooperative/Public bank daughter	39	36%	14	38%
Public investor	6	6%	3	8%
Total sample	**107**	**100%**	**37**	**100%**

Table 41 The sample frame compositions (own development)

This selection represents a proportion of approx. 35% of the main study sample frame. Independent investors are underrepresented in the validation study sample frame as this type of investor disproportionately often refused to participate on surveys during the main study.

In the second validation study, the questionnaire was sent by e-mail and the data was finally collected by telephone interviews. This second validation study based on a purposive selection of four so-called Mittelständische Beteiligungsgesellschaften in order to validate the results from the MBGs.

The validation study results were analysed by means of descriptive statistics in order to calculate the frequencies and proportions of confirmation, disagreement and of no assessments.

The whole research progress is presented in the subsequent figure three.

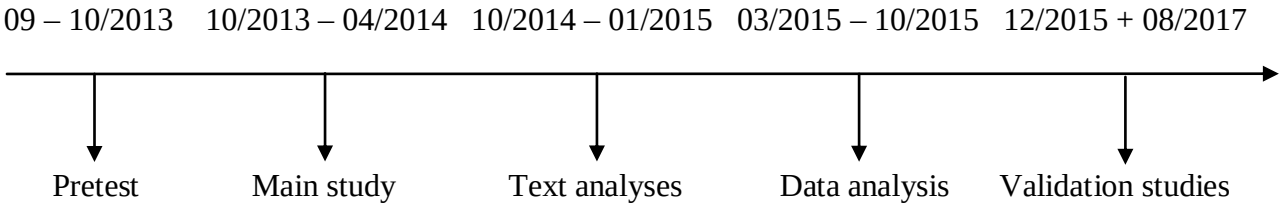


Figure 3 The research progress of the present thesis (own development)

Chapter 6 The results and conclusions

This chapter presents the examination results. The present study was carried out to examine Germany's economic and innovation political strategy, to examine the progress of public funding on the federal level and to examine the German PE and VC market with respect to investors' investment strategy, investment behaviour and investment process (see also section 4.6.4). The first part of this chapter is concerned with the examination results from the economic reports, the federal research reports and from the KfW reports. Part two is then concerned with the examination results from the survey and from the BVK publications. Finally, this chapter presents the validation study results.

6.1 The results of the content analyses

The analyses were carried out between October 2014 and January 2015. A recheck for validation purposes was subsequently carried out in November 2015 and December 2015. The subsequent presentation starts with the results for the economic report 2010 (BMWi 2010).

6.1.1 The analysis results of the economic report 2010

The analysis of the economic report 2010 (BMWi 2010) showed that the government was concerned with the economy's recovery and the consolidation of public households. The German government launched two conjuncture programmes to relieve both private households and enterprises. In addition, two laws came into force to stabilise the financial sector by public equity investments and bad bank solutions. The government was concerned with the significantly increasing public indebtedness due to the extent of the public stabilisation measures and therefore adopted a constitutional debt rule in 2009. This debt rule limits public borrowing to 0.35% of the annual GDP from 2011 on.

Overall, the government emphasised the exit from the public stabilisation measures on the one hand and economic growth perspectives by structural reforms on the other hand. In order to fulfil the requirements of the debt rule, the government was focused on efficiency gains in the existing system rather than on credit financed tax reductions and public expenses. Despite the strong budget consolidation requirements due to the future debt rule, the review showed that the government emphasised education, research and innovation as central prerequisites for economic

growth. This national perspective was implemented in accordance with the European stability and growth act, the European resolutions regarding the exit from the public stabilisation measures and the European Lisbon strategy (BMWi 2010). This European strategy ran over a period of ten years and was launched in 2000. The strategy was focused on research and development and on the attempt to increase investments for research and development up to 3% of European Union's annual GDP. This strategy was also focused on the liberalisation of national labour and service markets, the reduction of bureaucracy costs and on environmentalism (Bundesregierung 2015).

According to innovation political measures, the review showed that the government intended to increase the expenses for education and research up to 10% of the GDP until 2015. Therefore and in order to improve the education and research conditions in Germany, the government launched a so-called qualification initiative already in 2008. As a result, the government approved additional 12 billion euros for education and research during the political session. The government also decided to increase the expenses for the German research organisations by 5% annually from 2011 on. With regard to the relaunch of the Hightech-Strategy 2006 in 2010, the government emphasised the importance of the health care sector due to its stabilisation contribution during the financial crisis. Therefore, this sector from the future on will not be regarded under a cost point of view but as important for economic growth and employment.

The review of the appendix from the economic report 2010 (BMWi 2010) is summarised in the subsequent table 42.

The selected measures from economic report 2010		
Economic, finance, innovation political measures		
No.	Programme title and description	Since
1.	Financial market stabilisation law: • Public equity investments on distressed banks.	2009
2.	Improvement of financial market stabilisation: • Bad bank solutions for distressed banks.	2009
3.	Conjuncture programme II: • Economical stabilisation.	2009

9.	Economic fund Germany: • Credit improvements for SMEs and bigger-sized enterprises.	2009
16.	Masterplan environmental technology: • Market development for environmental technologies.	2008/ 2009
17.	Economic acceleration law: • Conjuncture stabilisation by tax reductions.	2010
18.	Second reform of Germany's federal system: • Implementation of a constitutional debt rule from 2011 on.	2009
44.	High-Tech Gründerfund: • Prolongation of fund's investment period until 2011.	2010
45.	Mobilisation of PE and VC: • Additional 220 MEUR for KfW's so-called ERP-Startfund	2009
59.	Qualification initiative: • Increase of public expenses for education and research.	2008
64.	Prolongation of the university agreement 2020: • Improvement of research and study conditions.	2009
65.	Progress report Hightech-Strategy 2006: • Decision making regarding strategy's relaunch.	2006/ 2009
66.	Energy research: • Prolongation of the 5th energy research programme until 2010.	2009
67.	Climate research: • Strategy to improve the competitiveness of climate technologies.	2007/ 2010
68.	Research for sustainable development: • Research support for climate, energy, environmental technologies.	2009
69.	Health research programme: • Development of new research approaches, research support, etc.	2009
71.	Biotechnology support programme: • Development of a research strategy.	2009
72.	Aviation research programme: • To improve the innovation capacity of the aviation industry.	2007/ 2010
73.	Space programme: • To improve the innovation capacity of the space industry.	2010

74.	Integrated energy and climate programme electric mobility: • Development of a research strategy for electric mobility.	2009
75.	Information and communication technological strategy: • Development of a digital strategy for Germany.	2009
78.	Programme ICT 2020: • Research support for information and communication technologies.	2009
79.	Central innovation programme (ZIM): • Additional funds in the amount of 900 MEUR.	2009
82.	Prolongation of the research and innovation agreement: • Additional funds for the leading research institutions in Germany.	2009

Table 42 The selected measures from economic report 2010 (derived from BMWi 2010)

6.1.2 The analysis results of the economic report 2011

The review of the economic report 2011 (BMWi 2011) showed that the European Union member states adopted a follow-up strategy for the Lisbon strategy in 2010. This new European-wide strategy, the so-called Europe 2020, was adopted to improve Europe's competitiveness, to increase productivity and economic growth, and to improve social integration. These central elements were associated with specific national aims which, in the case of Germany, were employment support, the implementation of climate and energy related aims, the improvement of the educational standard and finally the strengthening of social integration.

In the beginning of the post-crisis phase, the government was focused on public budget consolidation and the recirculation of the governmental measures. The government appointed an expert panel to find exit solutions regarding the public equity investments in the bank sector. In order to fulfil the future debt rule, the government reduced public investments and shortened public subsidies. The consolidation measures were implemented by the so-called future package which was associated with public household consolidation in the volume of approx. 80 billion euros until 2014. The government argued that household consolidation would be compulsory as solid public households would result in smaller taxes and levy. As a consequence, consumption, investments and employment would increase. The government also mentioned the risk of initially decreasing economical activity due to the consolidation measures with both decreasing public support and additional tax burdens. The government in that context argued along the so-

called non-Keynesian effect which assumes that both investments and consumption would increase at the moment of the consolidation. The society would expect to benefit from public reliefs in the future due to the consolidation efforts (BMWi 2011). On the other hand, the review showed that the expenses for education and research were excluded from the consolidation measures due to the qualification initiative (BMWi 2010, see consecutive number 59, in table 42 in section 6.1.1). In addition, the government adopted an economic acceleration law with smaller tax reliefs for both families and enterprises. The related law was already adopted in 2010 (BMWi 2010, see consecutive number 17, in table 42 in section 6.1.1).

With regard to innovation political measures, the review showed that the adjusted HTS was still focused on climate and energy, health and nutrition, mobility, safety and communication. These research areas were addressed by the implementation of future projects which are part of the modified Hightech-Strategy 2020. The review, furthermore, showed that the government emphasised the economic potential of the information and communication technologies and the new medias. In order to support the technology transfer of the IT sector and to integrate the internet in the society, the government launched the so-called Digital Agenda in 2010. This strategy, with a duration until 2015, has been supported from an annual IT summit on the level of the government. The review showed that a research priority of the government was still on energy and climate research. In that respect, the government focused on research support regarding the efficient use of natural resources and energy, the use of biomass, sustainable water management systems and the use of photovoltaic. These areas were regarded as very important due to their growth potential and economic contribution (BMWi 2011).

The analysis of the appendix from the economic report 2011 (BMWi 2011) delivered the following result (see subsequent table 43).

The selected measures from economic report 2011		
Economic, finance, innovation political measures		
No.	Programme title and description	Since
3.	Expert panel: • Development of exit strategies in the financial sector.	2010
39.	Programme bureaucracy reduction: • To boost economy's activity and innovation investments.	2010/ 2011

68.	Hightech-Strategy 2020: • Relaunch of the HTS to improve the innovation conditions in Germany.	2010
72.	Central innovation programme (ZIM): • Modification regarding the application on individual research projects.	2010
73.	KMU-innovativ: • Modification regarding programme's application.	2010
76.	Digital Agenda 2015: • Strategy regarding the economical use of ICTs and the new medias.	2010
77.	National IT summit: • Dialogue platform to implement the ICT strategy until 2013.	2010
78.	Programme cloud computing: • Coordination platform regarding the use of cloud computing.	2010
80.	Research for sustainable development: • Research support for resources management, energy technologies, etc.	2010
81.	National research strategy bio economy 2030: • Support regarding the application of bio-technologies.	2010
82.	Research programme health care: • Realignment of health research on specific areas.	2010
83.	Research and innovation programme climate protection: • Alignment of climate protection on specific future projects.	2007/ 2011
98.	Innovation alliance photovoltaic: • To improve the competitiveness of the photovoltaic industry.	2010
102.	Energy research programme: • Additional funds for energy research.	2010/ 2011

Table 43 The selected measures from economic report 2011 (derived from BMWi 2011)

6.1.3 The analysis results of the economic report 2012

The review of the economic report for 2012 showed that the core elements of European's economic and finance policy were basically concerned with the reduction of public's indebtedness, economic growth, competitiveness and financial market's stabilisation. In that context, the European Union agreed on the modification of the stability and growth pact which is concerned with minimum budget requirements for EU member states and stronger deficit

criteria. In order to avoid future economic imbalances, the EU recommended specific national aims which might result in sanctions from future on in the case of their disregard. In addition, the EU launched a permanent bailout fund to avoid member state's insolvencies. The EU also introduced the so-called European semester as a monitoring period regarding the transformation of economic and finance political measures of the member states (BMWi 2012).

The review, furthermore, showed that the government in Germany followed a course of strict household consolidation to fulfil the debt rule. As a consequence, the public budget deficit fell below the 3% barrier in 2011. The government still underlined the importance of education and research and from now on also of public infrastructure investments. Therefore, the government intended to provide additional funds.

With regard to the national innovation policy, the review showed that the government still emphasised energy research. This was, inter alia, underlined by the introduction of an individual programme for research regarding electric mobility and the launch of a new energy research programme with additional funds. This programme was focused on research in the field of renewable energy, energy efficiency, energy storing and network technologies. These research areas are aimed to support the integration of renewable energy in the energy system of Germany. The review also showed that the government was focused on health research to improve the research result transformation into medical care and on the support of the medical technical sector. The government also underlined the requirement of enterprise founding and therefore, inter alia, introduced the so-called German Silicon Valley initiative in 2011. This initiative attempts to establish a network in the US for enterprise founders. In addition, the government launched the second High-Tech Gründerfund in 2011. The analysis of the appendix from the economic report 2012 (BMWi 2012) delivered the following result (see subsequent table 44).

The selected measures from economic report 2012		
Economic, finance, innovation political measures		
No.	Programme title and description	Since
28.	Research agenda demographic change: • Fundamentals regarding product and service innovation.	2011
69.	National masterplan maritime technologies: • Strategy process regarding the support of maritime technologies.	2011

70.	Call for proposals in the aviation research programme: • Funding of research cooperation.	2011
73.	Research campus: • Funding of research cooperation to boost the technology transfer.	2011
75.	German Silicon Valley Accelerator: • Network support for IT-based start-ups in the US.	2011
76.	High-Tech Gründerfund: • Launch of a second High-Tech Gründerfund.	2011
78.	Modification of the programme ZIM: • Funds in the amount of annually 500 MEUR for 2012 to 2014.	2011
79.	Modification of the programme KMU-innovativ: • Application on every technology funding area of the BMBF.	2011
80.	New initiatives in the health research programme: • Strategy process innovation in medicine technologies.	2011
81.	Governmental programme electric mobility: • Research support regarding electric mobility.	2011
102.	6th energy research programme: • Budget increase to approx. 3.5 billion euros for 2011 to 2014.	2011

Table 44 The selected measures from economic report 2012 (derived from BMWi 2012)

6.1.4 The analysis results of the economic report 2013

With regard to European policy, the review of the economic report 2013 (BMWi 2013) showed that the EU member states adopted a growth and employment treaty in June 2012. This agreement underlined the requirement of collective European initiatives for future growth and the improvement of competitiveness in the European Union. In that context, the EU member states signed the so-called fiscal agreement in 2012, which is focused on stability, coordination and the regulation of the member states. By signing the fiscal agreement, the member states agreed on future national budget discipline, the improvement of economic political coordination and obliged themselves to adopt national debt rules until 2014. This objective was associated with the introduction of the so-called Twopack regulation which strengthened the monitoring rights of the EU with regard to the national budgets and possible budget adjustments (BMWi 2013).

The review also showed that the German government still emphasised a course of strong household consolidation. On the other hand, the government underlined the importance of SMEs for the economy and, moreover, open markets with flexible price systems. Therefore, the government modified the competition law in 2012. With regard to innovation policy, the review basically showed that the HTS 2020 was supplemented by a so-called action plan in 2012. The action plan contains ten different future projects along the demand areas of climate and energy, health and nutrition, communication, mobility and safety. These future projects follow detailed scientific and technological aims whose achievement is based on cooperation between the private economy, the sciences and the politics (BMWi 2013).

According to the European-Plus-Act and Germany's self-commitments for 2012, the government, inter alia, intended to improve the financing conditions for enterprise founding and for enterprise financing. Therefore, the German government launched the so-called European Angels Fund (see glossary) in 2012. Moreover, the government decided to subsidise business angels investments from 2013 on and launched a venture capital investment grant (see glossary) in order to improve the entrepreneurial activity in Germany. In addition, the government launched the so-called Mezzanine Fund for Germany (see glossary), increased the guarantee amounts of the public-owned guarantee banks for SME financing, and also increased the investment amounts of the MBGs (BMWi 2013).

The analysis of the appendix from the economic report 2013 (BMWi 2013) delivered the following result (see subsequent table 45).

The selected measures from economic report 2013		
Economic, finance, innovation political measures		
No.	Programme title and description	Since
76.	Action plan: • Specification of ten future projects in the HTS 2020.	2012
77.	Innovation concept passion for technology: • Concept to increase the proportion of research active enterprises.	2012
83.	Central innovation programme (ZIM): • Modification regarding the application on bigger-sized enterprises.	2012

84.	KMU-innovativ: • Adjustments regarding the programme application.	2012
86.	Venture capital investment grant: • To boost private investors' investments.	2013
87.	European Angels Fund: • To boost business angels' investments.	2012
90.	Programme for the public guarantee banks and the MBGs: • Increase of the guarantee and of the investment amounts.	2013
121.	R&D programme economic important resources for Germany: • Research funding regarding economical relevant resources.	2012

Table 45 The selected measures from economic report 2013 (derived from BMWi 2013)

6.2 The analysis results of the research reports

6.2.1 The analysis results of the research report 2012

With regard to the central education, research and innovation political objectives, measures and priorities on the federal level, the review lead to the following results. The review showed that Germany's growth strategy attempted to address an increased global research and innovation competition, the limitations on resources and the acceleration of the climate change. The German government emphasised the interaction of environmentalism, economic strength and social responsibility in order to keep pace with these developments. This basic strategy of the government resulted in the following four research, educational and innovation political priorities:

1. Intensification of international cooperation.
2. Expansion of educational measures.
3. Strengthening of sciences.
4. Modification of the Hightech-Strategy 2006.

Internationalisation of research and sciences is one of the core elements of Germany's research policy. This strategy is focused on the identification of the most successful science structures in the world and their utilisation for Germany's scientific area. The review also showed that the

government intended to improve international research cooperation in order to address the future challenges of climate change, food crises and limitations of resources.

The review, furthermore, showed that the basic element behind Germany's education and innovation policy was embedded in the so-called qualification initiative from 2008. This initiative was launched in order to achieve an increase of expenses for education and research up to 10% of the GDP until 2015. Central aspects in that respect were an increasing population of students, less early-school leavers and an increasing proportion of adult qualification. These educational aims were required due to the demand on skilled employees and to preserve the innovation capacity and thus the competitiveness of the country.

With regard to the scientific system, the government was focused on the intensification of research cooperation between scientific institutions, research organisations and the private economy. The review also showed that the government prolonged the three scientific reform initiatives. The first was the so-called quality agreement for the improvement of universities. The second was the so-called excellence initiative to boost cutting-edge research and the third was the agreement for research and innovation to support the leading research organisations in Germany until 2015**.**

With regard to the governmental innovation policy, the review showed that the priority in that respect was on the acceleration of the technology transfer, the improvement of financing conditions for technology-based enterprise founding and for innovation projects. In addition, the government was concerned with business model innovations as important drivers for the change of whole industry sectors. The governmental innovation policy was also focused on standardisation measures to ensure easier product launches and intended to align the public procurement on the purchase of innovative products and processes. The government was also concerned with the promotion of the most successful technology clusters in Germany and established an innovation dialogue on the level of the chancellor in 2010. This dialogue forum was aimed to discuss innovation financing, network support and technological areas with representatives of the economy and the sciences.

According to the HTS 2020, the government established a detailed action plan with future projects. These future projects are associated with support-worthy research areas due to their economical relevance. They are subsequently described in greater detail and in the context of

governmental research priorities. In terms of economical relevance and research funding, the review showed that the government prioritised the following research areas:

1. Health care and medical technology.
2. Provision, agriculture and consumer protection.
3. Climate, energy and environmentalism.
4. Energy research and energy technologies.
5. Urban development, habitation and construction research.
6. Mobility, traffic and maritime technologies.
7. Information and communication technologies.
8. Security, peace and conflict research.
9. Military research.
10. Key technologies.
11. Working conditions and the service sector.
12. Educational innovations.
13. Humanities, social sciences and economics.

The first research priority health care and medical technology is based on a programme that was launched in 2010. Due to the increasing number of chronic diseases and due to the demographic change, the government attempted to improve the innovation capacity of the health sector and to accelerate the research transfer in patients care. In addition, the government launched the so-called strategy process innovation in the medical-technical sector to boost the technology transfer. This research focus is associated with two future projects. First, the project individualised medical care which is focused on the assessment of disease risks. Second, the project self-determined life of elderly citizens which is focused on integration and elderly citizens care. The research focus provision, agriculture and consumer protection is concerned with the global challenges of food supply, climate change and the preservation of natural resources. As a consequence of food demand's doubling until 2050, this research area is focused on the increase of agricultural productivity, quality assurance in the food sector and the reduction of animal diseases. The future project prevention and nutrition in that respect is focused on research regarding the effects of ingredients in nutrition. The third research priority climate, energy and environmentalism is based on the governmental sustainability strategy and on government's decision to give up nuclear energy production until 2022. In order to intensify this so-called energy turn, the research support is focused on new energy resources, energy storage,

energy grids and energy efficiency. Three individual future projects in the HTS 2020 are concerned with energy research. The first project is energy efficient cities which is focused on research regarding mobility systems, energy efficient housings and the expansion of energy grids. The second future project is renewable raw materials as oil alternatives. This project is focused on the use of biomass. The third project is concerned with the modification of the energy system in order to support the energy turn. Therefore, the government launched the so-called sixth energy research programme for the funding period between 2011 and 2014. The fifth research focus is concerned with urban development and construction research to improve the energy efficiency of existing buildings, to ensure age-appropriate buildings and to boost innovations in the construction sector. The research focus mobility, traffic and maritime technologies is, inter alia, concerned with research support regarding traffic infrastructure systems, the use of electric mobility and of environmental friendly maritime technologies. The future project sustainable mobility in the HTS 2020 is focused on electric mobility and the application of both hydrogen and fuel cell technologies. In that respect, the government attempts to achieve the reduction of traffic sector's energy consumption by approx. 40% until 2050 in comparison to 2005. The seventh research priority is information and communication technologies. This research area is associated with two future projects. The first is the project industry 4.0 which is focused on the so-called cyber-physical systems and smart factoring. Research in that respect is required to address more individualised product development as a consequence of open innovation. The future project internet-based systems for the economy is focused on business models in the internet. The research focus security, peace and conflict research is focused on both the prevention and handling of crises. The future project of the HTS 2020, the so-called project safe identities in the internet, is concerned with privacy and safety in the internet. The government attempts to ensure a safe environment for successful business applications in the World Wide Web and tries to improve the growth of internet-based business models. These future projects have each individual budgets which are summarised in the subsequent table 46.

The budgets of the future projects			
Rank	Project specification	Budget in MEUR	Share in %
1.	Modification of the energy system	3,700	44.34
2.	Sustainable mobility	2,190	26.24
3.	Renewable raw materials as oil alternative	570	6.83
4.	Energy efficient cities	560	6.71
5.	Individualised medical care	370	4.43
6.	Self-determined life of elderly citizens	305	3.66
7.	Internet-based systems for the economy	300	3.59
8.	Industry 4.0	200	2.40
9.	Prevention and nutrition	90	1.08
10.	Safe identities in the internet	60	0.72
	Total budget	**8,345**	**100.00**

Table 46 The budgets of the future projects (derived from BMBF 2012)

The subsequent table 47 summarises the project budgets along main subjects. This shows that approx. 58% of research funding is directly associated with energy research and a comparatively smaller proportion with mobility research, internet research, medical care research and research regarding the demographic change.

The summarised budgets of the future projects			
Rank	Project area	Budget in MEUR	Share in %
1.	Energy	4,830	57.88
2.	Mobility	2,190	26.24
3.	Internet	560	6.71
4.	Medical care and health research	460	5.51
5.	Demographic change	305	3.66
	Total budget	**8,345**	**100.00**

Table 47 The summarised budgets of the future projects (derived from BMBF 2012)

The review, moreover, showed that additional research priorities were in the field of military research, key technologies, working conditions, education innovations, the humanities, economics and the social sciences. Finally, the review of the present research report (BMBF 2012) confirmed and expanded the review results of the economic reports with regard to the:

- launch of a second High-Tech Gründerfund by the KfW in 2011; volume 291 MEUR;
- launch of a second ERP-Startfund by the KfW in 2011; fund volume 250 MEUR;
- application of the programme KMU-innovativ for medical technological research.

6.2.2 The analysis results of the research report 2014

According to the European policy, the review initially showed that innovation policy was a core element to preserve the competitiveness of the EU. The European strategy 2020 in that respect is associated with three political strategies:

1. The innovation union.
2. The European research area (BMBF 2014).
3. The framework programme Horizon 2020.

The innovation union is the central European initiative and is concerned with the improvements of the conditions for research and innovation. This initiative is aimed to establish the so-called European research area, to coordinate public funding measures and to support the whole innovation chain from basic research to product launches (BMBF 2015a). The European research area on the other hand is aimed to achieve equal research and innovation conditions in Europe. The implementation of the European research area is supported by the perennial funding programmes of the European Union. The current programme so-called Horizon 2020 has a total budget of 75 billion euros for the period between 2014 and 2020. Horizon 2020 is focused on the intensification of research cooperation on the one hand and research funding of key technologies on the other hand (BMBF 2015b). This programme also attempts to boost the technology transfer and to increase private economy investments for research and innovation (BMBF 2014).

The review showed that in the context of this European innovation policy, the German government still focused on education, research and innovation to withstand the competitive global environment. With regard to educational political objectives, measures and priorities, the review showed that the government still emphasised the significance of education to ensure a skilled-worker basis in the economy. In order to avoid a skilled-worker constraint as a consequence of the demographic change, the government builds on early childhood education and long life learning (BMBF 2014).

With regard to the scientific environment in Germany, the review showed that the government adopted a so-called scientific liberty act in late 2012. This act allows the public funded research organisations more flexibility regarding their budgets (BMBF 2015c). A core objective of the government is the strengthening of universities, the support of research organisations, the further expansion of networks and the support of cooperation in the research environment (BMBF 2014).

The review, furthermore, showed that the innovation policy was still aligned on the adjusted HTS 2020. As in the research report 2012 (BMBF 2012), the review of the report 2014 (BMBF 2014) showed that the government was focused on the improvement of the technology transfer, the public procurement of innovative products and services, and on product standardisation. The government still emphasised the significance of research support regarding key technologies and their earlier application in products, processes and services.

In the context of research funding, the review showed that the government intended to improve the quality assurance system by additional impact analyses (BMBF 2014).

The further review of the present research report 2014 (BMBF 2014) confirmed and expanded the results of the economic report review with regard to the:

- increase of High-Tech Gründerfund's fund volume to 304 MEUR:
  a) public investment 260 MEUR;
  b) private investors' investment 44 MEUR;
- launch of a venture capital investment grant in 2013.

6.2.3 The analysis results regarding the federal research subsidies

The analysis regarding the research grant ZIM showed that the government expanded the budget significantly in the amount of 900 million euros in 2009. This additional budget was part of the conjuncture programme II (see section 4.5.2). The further review showed that the central innovation programme was budgeted with annual amounts of 500 million euros each for 2012, 2013 and 2014 (BMWi 2012, see consecutive number 78, in table 44 in section 6.1.3). Additional funds were also provided for the programme KMU-innovativ without detailed specification in the literature. Both programmes were significantly improved regarding their

application during the post-crisis phase. This applies in terms of enterprise sizes and for the application on specific research areas (BMWi 2011; BMWi 2012; BMWi 2013).

Belitz et al. (2012) calculated disbursed funds of the ZIM in the amount of four million euros in 2008 and 155 million euros in 2009 (see also section 4.5.2). During the post-crisis phase, the volumes of the ZIM reached 652 million euros in 2010, 712 million euros in 2011 and 445 million euros in 2012 (BMWi 2015). Rammer et al. (2011), with regard to the progress of the disbursed funds for KMU-innovativ, calculated eight million euros for 2008 and 45 million euros for 2009 (see also section 4.5.2). They also calculated disbursed funds of 78 million euros for 2010 and estimated a payment of at least 75 million euros in 2011 (Rammer et al. 2011). The review of the research report 2014 (BMBF 2014) showed that in 2013, an amount of approx. 100 million euros was paid out for the programme KMU-innovativ. The further review, moreover, showed that there was no reliable data regarding the progress of funds for the programme KMU-innovativ. Therefore, the values for 2011 and 2012 were estimated in the amount of 90 million euros and 100 million euros respectively. The subsequent table 48 summarises the progress of the programmes ZIM and KMU-innovativ for both the initial and the post-crisis phase.

The disbursed grants of the federal research subsidies						
Year	2008	2009	2010	2011	2012	**Total**
Programme	in MEUR					
ZIM	4	155	652	712	445	**1,968**
KMU-innovativ	8	45	78	90	100	**321**
Total	**12**	**200**	**730**	**802**	**545**	**2,289**

Table 48 The disbursed grants of the federal research subsidies
(derived from Rammer et al. 2011; Belitz et al. 2012; BMWi 2015; own estimation)

6.3 The initial analysis results of the KfW reports

The funding and equity financing programmes of the KfW each have specific German terms which describe the funding purpose of each programme. In order to ensure the traceability of the results, the subsequent clarifications in the tables are associated with the original German term and an additional clarification in English. Furthermore, each equity financing programme is clarified in greater detail in order to comprehend their specific purpose. The co-investments of

the KfW are clarified in greater detail in the glossary. The KfW provides a larger number of credit programmes for enterprise financing and enterprise founding (see also section 4.5.1). Therefore, the subsequent clarifications concentrate on the most important programmes.

The funding programmes for enterprise founding are issued for succession solutions, for business creation or for growth purposes. The credit programmes vary in their specific credit amounts and periods. In some cases, the credits do not cover the full project costs so that an own contribution usually in the proportion of 20% is required. The credits for enterprise founding are redemption free in the beginning and the credit conditions are subsidised by the so-called European Recovery Programme or by funds from the European Union. A direct credit request is not possible and therefore a private bank is interposed between the KfW and the borrower. The private bank is responsible for the credit monitoring but not liable for the credit default in the case of credits for enterprise founding (KfW 2015). The review also showed that the most important credit programme of the KfW for enterprise financing is the so-called KfW-Unternehmerkredit (KfW 2011a; KfW 2012a; KfW 2013a). This KfW credit is concerned with both investment and inventory financing of enterprises with annual turnovers of maximum 500 million euros. The lending rates are comparatively small and a credit request requires the interposition of a private bank too. The private bank is responsible for the credit monitoring and free from default liabilities. This applies for a proportion of 50% from the credit amount. Additional KfW programmes are concerned with the funding of projects in the less structured regions or the eastern part of Germany (KfW 2015). On certain occasions, KfW funding is also concerned with special purpose financing, as in the case of the so-called KfW-Sonderprogramm (see also section 4.5.2) to stabilise the economy (KfW 2012a; KfW 2013a).

6.3.1 The analysis results of the KfW annual support reports

The business volume of the so-called KfW-Mittelstandsbank in the annual support reports (KfW 2011a; KfW 2012a; KfW 2013a) is summarised along the basic subjects:

- enterprise founding and SME financing;
- innovation financing;
- environmental projects (see also section 5.6.5).

This presentation encompasses each funding programme which is issued by the KfW-Mittelstandsbank. Financial crisis related financing measures are not separately listed. This required the reclassification of the annual support reports in order to comprehend the progress of KfW's funding measures. The reclassified examination areas were:

- enterprise founding and SME financing;
- innovation financing;
- equity financing;
- financial crisis related measures (see also section 5.6.5).

The results of the initial reclassification are presented in table 49 (see appendix N.1). This presentation initially separated the equity funding programmes, the financial crisis related measures and excluded advisory grants. A more compromised summary of the business volume is then presented in table 50 (see appendix N.2). The aggregated business volume of the KfW Mittelstandsbank is presented in the subsequent table 51. This summary shows that the entire business volume of the KfW was distorted by financial crisis related financing measures in the amount of approx. 14.8 billion euros between 2009 and 2011. Without these financial crisis related measures, the business volume of the KfW would have declined significantly between 2008 and 2009. This applies both for enterprise financing and enterprise founding but also for the equity funding programmes. Overall, the business volume of the KfW-Mittelstandsbank increased between 2010 and 2012, even though only slightly due to the significant decrease of the innovation and equity financing programmes.

The aggregated business volume of the KfW					
Year	2008	2009	2010	2011	2012
Programme purpose	in MEUR				
Enterprise founding and SME financing	10,212	7,400	8,950	8,416	10,859
Innovation financing	888	1,220	2,039	2,144	901
Equity financing	261	201	225	201	171
Subtotal	11,361	8,821	11,214	10,761	11,931
Financial crisis related measures	-	7,948	6,176	691	-
Total	**11,361**	**16,769**	**17,390**	**11,452**	**11,931**

Table 51 The aggregated business volume of the KfW
(derived from KfW 2011a; KfW 2012a; KfW 2013a)

In 2014, the KfW issued four different equity financing programmes. These were, according to their original terms, the so-called ERP-Startfund, the ERP-Beteiligungsprogramm, the KfW-Risikokapitalprogramm and the KfW-Programm Beteiligung Sozialunternehmen (KfW 2015). The so-called ERP-Startfund was launched in early 2005 due to the decreasing number of enterprise founders and the market gap in early-stage financing (Renz 2014a). The ERP-Startfund is focused on equity investments in technological enterprises which may not be older than ten years, may not employ more than 50 employees and whose annual turnover may not exceed ten million euros (KfW 2015). According to the responsible investment director, the fund is focused on equity investments in the IT, the internet, the environmental protection sector and in addition with energy storing technologies in order to support the energy turn (Renz 2014b). The ERP-Startfund is a co-financing fund which requires the co-investment of a KfW accredited lead investor (KfW 2015). This fund meanwhile co-financed almost every venture capital firm in Germany (Renz 2014c). The investment conditions of the ERP-Startfund are the same as of the lead investor, who is responsible for the portfolio company and obliged to report regularly (KfW 2015).

The so-called ERP-Beteiligungsprogramm on the other hand is a 100% refinancing measure for investments of PE and VC firms. The underlying investment must be concerned with enterprise founding, restructuring, shareholder's compensation or the financing of innovative projects. The equity investor receives an investment credit from the KfW in the amount of 1.25 to 2.5 million euros for an investment period up to twelve and a half years. The ERP-Beteiligungsprogramm

requires the guarantee from a public guarantee bank to protect the KfW from the default risk. The equity investor takes the full risk as additional collateralisation is not possible. The programme is focused on equity investments in enterprises with at most 75 million euros on annual turnovers (KfW 2015).

The so-called KfW-Risikokapitalprogramm is concerned with direct guarantees of the KfW for equity investments of independent PE and VC firms. In that case, the investment is guaranteed in a proportion of 40% to 50% from a maximum investment of five million euros per deal. Additional guarantees are not possible and the programme is focused on investments in enterprises with no more than 500 million euros on annual turnovers. This programme is applied for succession solutions, shareholder's compensation or for growth purposes (KfW 2015).

The programme so-called Beteiligung Sozialunternehmen is concerned with equity investments in social enterprises. This programme, which is not applicable for enterprise founding, requires the co-investment of a lead investor. The KfW participates to equal conditions with investment amounts between 50,000 euros and 200,000 euros per deal (KfW 2015).

The subsequent table 52 details the progress of KfW's equity financing programmes, whose volumes decreased significantly by approx. 23% between 2008 and 2009. During the post-crisis phase, the volumes initially recovered in 2010 but subsequently decreased both in 2011 and 2012. This progress stands for a decline of approx. 35% between 2008 and 2012. In that respect, almost every programme suffered from decreasing investment volumes (KfW 2011a; KfW 2012a; KfW 2013a). With regard to the decrease of the ERP-Startfund, the responsible investment director from the KfW points out that lead investors, which in their majority would be VC investors, were decrementally withdrawing from the PE and VC market during the post-crisis phase. He supplements that the venture capital firms were not able to realise successful exits and hence did not achieve the proposed investment returns. Consequently, investors denied to reinvest in subsequent venture capital funds, which resulted in the declining demand for both co- or refinancing measures of the KfW (Renz 2014b).

The investment volumes of KfW's equity financing programmes					
Year	2008	2009	2010	2011	2012
Equity financing programmes	in MEUR				
ERP-Startfund	63	71	80	70	58
(Co-financing measure for equity investments)					
ERP-Beteiligungsprogramm	65	66	90	83	69
(Refinancing measure for PE and VC firms)					
KfW-Risikokapitalprogramm	114	61	50	29	26
(Refinancing measure for PE and VC firms)					
Programm Beteiligung Sozialunternehmen	-	-	-	-	0
(Co-financing measure for equity investments)					
Sonstige Beteiligungsprogramme	19	3	5	19	18
(Various equity financing measures; ns)					
Total	**261**	**201**	**225**	**201**	**171**
Total number of investments	614	560	614	541	464
Average investment volume in MEUR	0.43	0.36	0.37	0.37	0.37

Table 52 The investment volumes of KfW's equity financing programmes (own development)

6.3.2 The analysis results of the KfW report 2010

With regard to the funding programmes for enterprise financing, the review showed that the entire volume of the so-called KfW-Sonderprogramm decreased significantly due to economy's recovery in 2010. This credit financing programme was launched during the initial phase of the financial crisis to support the credit provision of the economy and to boost investments of enterprises (see also section 4.5.2). The review showed that the KfW improved the financing conditions of the so-called KfW-Sonderprogramm, prolonged the credit durations and also prolonged the fixed interest periods. With regard to innovation financing, the review showed that the progress in that respect was distorted by a specific research and development measure in the amount of approx. 1.2 billion euros in 2010 (KfW 2011). The recourse to the appendices of the economic reports showed that the government adopted a special aviation financing programme in 2010 (BMWi 2011). This programme was concerned with the funding of research cooperation between the aviation industry and research organisations, and was phased out in 2012 (BMWi 2011). With regard to funding measures for enterprise founding, the KfW emphasised this funding area as the most important area of the KfW-Mittelstandsbank. The KfW also underlined the requirement of public funding for enterprise founding due to an existing financing gap, the lack of securities and the negation of private banks to provide founder loans. With regard to

equity financing and KfW's co-investments, the review showed that the KfW improved the conditions for the so-called ERP-Startfund and increased the co-investment proportion from 50% to 70% and the co-investment amount from five to six million euros. The review, furthermore, showed that the KfW co-financed an equity financing fund, the so-called Eigenkapitalfund for the German Mittelstand (see glossary). This externally managed fund was launched in 2010 due to the decreasing equity proportions of enterprises during the financial crisis. The KfW initially co-financed 100 million euros in 2010 (KfW 2011).

6.3.3 The analysis results of the KfW report 2011

With regard to enterprise financing, the review initially showed that the KfW emphasised the importance of the so-called KfW-Unternehmerkredit. This credit programme was regarded as the central KfW financing measure for SME funding. The review in that context also showed that the KfW discontinued the KfW-Sonderprogramm in 2011 as Germany's economy has recovered significantly. In the context of enterprise financing, the review showed that the KfW launched a new financing programme for film producing enterprises. These enterprises, which are part of the creativity and cultural sector, are regarded as promising and therefore as support-worthy. The review did not result in important clarifications regarding innovation financing. With regard to enterprise founding, the review showed that the KfW launched an additional programme with very small lending rates. In addition, the KfW improved the existing programme structure, inter alia, by doubling the credit amounts in some of the programmes. On the level of equity financing measures, the review showed that the KfW increased the fund volume of the so-called ERP-Startfund in the amount of 250 million euros in 2011. The total fund volume meanwhile reached 720 million euros. Furthermore, the KfW participated in the second High-Tech Gründerfund and co-invested 40 million euros. The fund volume of the HTGF reached 289 million euros in 2011 (KfW 2012).

6.3.4 The analysis results of the KfW report 2012

The review of the annual report 2012 showed that the KfW further improved the programme conditions for enterprise financing. In that respect, the KfW more than doubled the credit amounts from ten to 25 million euros and prolonged the fixed interest periods from the KfW-Unternehmerkredit. The KfW clarified that this significant improvement was required to support the middle-sized enterprises due to an increasing global competition. With regard to the decline

of innovation financing in 2012, the KfW pointed out that several larger credits were already issued in 2011. On the level of enterprise founding, the review showed that the KfW further improved the programme conditions by extending the fixed interest periods. In that respect, the KfW passed the cheap refinancing conditions from the capital market to the borrowers. With regard to equity financing programmes, the review showed that the KfW launched an additional equity funding programme for social enterprises in early 2012. This programme was launched to establish a PE and VC market for social enterprises in Germany. First investments were realised in 2012. In the context of the equity financing measures, the review also showed that the fund volume of the second High-Tech Gründerfund meanwhile increased to 294 million euros in 2012 (KfW 2013).

The analysis also showed that within the selected examination areas, namely credit programmes for enterprise founding and SME financing, innovation financing and equity financing (see section 5.6.5), the area of enterprise founding and SME financing was the predominating funding area. During 2008 until 2012, the proportion of credits for enterprise founding and SME financing on the entire programme volume varied between approx. 78% and 91% (see subsequent table 53). Within the credit programmes for enterprise founding and SME financing, the so-called Unternehmerkredit was the predominating type of credit both during the initial and the post-crisis phase. The proportion of the so-called Unternehmerkredit on credits for enterprise founding and SME financing decreased from 88.2% in 2008 to 71.9% in 2012 due to the significant increase of credits for enterprise founding. This proportion of credits for enterprise founding on credits for enterprise founding and SME financing increased from 2.9% in 2008 to 22.8% in 2012 (see subsequent table 53). With regard to equity financing measures, this part of the analysis showed that despite their significant expansion and improvement during the post-crisis phase (see sections 6.3.2, 6.3.3 and 6.3.4), their proportion on the entire programme volume, nevertheless, declined from 2.3% in 2008 to 1.4% in 2012 (see subsequent table 53).

KfW's programme proportions					
Year	2008	2009	2010	2011	2012
Programme volumes in MEUR					
Enterprise founding and SME financing	10,212	7,400	8,950	8,416	10,859
(Unternehmerkredit)	(9,010)	(6,365)	(8,006)	(6,338)	(7,811)
(Enterprise founding)	(297)	(341)	(399)	(1,111)	(2,472)
Innovation financing	888	1,220	2,039	2,144	901
Equity financing	261	201	225	201	171
Total I	**11,361**	**8,821**	**11,214**	**10,761**	**11,931**
Programme proportion in per cent of total I					
Enterprise founding and SME financing	89.9%	83.9%	79.8%	78.2%	91.0%
Innovation financing	7.8%	13.8%	18.2%	19.9%	7.6%
Equity financing	2.3%	2.3%	2.0%	1.9%	1.4%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Proportion of the Unternehmerkredit on enterprise founding and SME financing					
Proportion	**88.2%**	**86.0%**	**89.5%**	**75.3%**	**71.9%**
Proportion of the credits for enterprise founding on enterprise founding and SME financing					
Proportion	**2.9%**	**4.6%**	**4.5%**	**13.2%**	**22.8%**

Table 53 KfW's programme proportions (own development)

The analysis has, furthermore, shown that the proportion of KfW's equity financing measures on the entire PE and VC investments in Germany was on average 3.9% for the period between 2008 to 2012, approx. 4.7% for the period of the initial crisis phase in 2008 and 2009, and approx. 3.4% for the post-crisis phase respectively. Under the assumption that KfW's equity funding in its vast majority was associated with venture capital and hence early-stage financing (see also section 6.3.1), the proportion of KfW's equity financing measures on venture capital investments in Germany was on average approx. 28.9% for the period of 2008 to 2012, approx. 27.2% on average during the initial crisis phase of 2008 and 2009, and on average 30% during the post-crisis phase respectively. These analysis results are summarised in the subsequent table 54.

KfW's PE and VC proportions					
Year	2008	2009	2010	2011	2012
PE and VC financing in MEUR					
KfW equity financing volumes	261	201	225	201	171
PE and VC investments in Germany[1)]	9,584	3,024	4,895	6,667	6,455
VC investments in Germany[1)]	1,094	659	729	717	549
KfW proportion on PE and VC investments in Germany					
From total PE and VC investments	2.7%	6.7%	4.6%	3.0%	2.7%
From VC investments	23.9%	30.5%	30.9%	28.0%	31.2%

1) EVCA data (see table 11 in appendix G.2).

Table 54 KfW's PE and VC proportions (own development)

Beside the direct funding of the KfW, the analysis results have also shown that the KfW was active as a co-investor. During the post-crisis phase, the KfW invested in total 140 MEUR for equity funding measures outside the own business. The KfW paid 100 MEUR in the so-called Eigenkapitalfund for Germany in 2010 and 40 MEUR in the so-called second High-Tech Gründerfund (see subsequent table 55).

The co-investments of the KfW			
Year	2010	2011	2012
Type of fund	in MEUR		
Eigenkapitalfund for Germany	100		
(Equity fund for growth purposes)			
High-Tech Gründerfund II		40	
(Seed- and start-up financing fund)			
Total	**100**	**40**	**0**

Table 55 The co-investments of the KfW (own development)

The subsequent section summarises the equity funding measures which were launched and funded by the BMWi and the KfW.

6.4 The analysis summary

The subsequent table 56 summarises the progress of equity measures on the federal level between 2009 and 2013. This shows that the number of equity financing measures significantly increased during the post-crisis phase and that this phase was also associated with decisions regarding equity funding measures in the future.

The progress of the equity measures from the BMWi and the KfW		
Period	Year	Measure
Financial crisis	2009	Additional deposits for the ERP-Startfund.
		Prolongation of High-Tech Gründerfund's investment period.
Post-crisis phase	2010	Launch of the Eigenkapitalfund for Germany.
	2011	Launch of the 2. High-Tech Gründerfund.
		Additional deposits for the ERP-Startfund.
	2012	Launch of the European Angels Fund.
		Launch of the equity financing programme social enterprises.
Subsequent phase	2013	Launch of the Venture Capital Investment Grant.
		Launch of the Mezzanine Fund for Germany.

Table 56 The progress of the equity measures from the BMWi and the KfW (own development)

The volumes of the equity financing funds are summarised in the subsequent table 57. This shows that 200 million euros on additional equity financing capital was provided in the initial phase of the crisis and approx. 1.1 billion euros in the post-crisis phase. During the phase of 2010, 2011 and 2012, the government also decided on additional equity financing measures in the volume of 350 million euros for the subsequent periods.

The equity financing contribution of the KfW and the BMWi							
Year	2008	2009	2010	2011	2012	**Total**	2013
Fund name/initiative	in MEUR						
ERP Startfund[1)]		200		250		**450**	
Eigenkapitalfund for Germany			500			**500**	
Hightech-Gründerfund II				289	4	**293**	
European Angels Fund					60	**60**	
Equity fund for social enterprises					ns	**0**	
Venture Capital Investment Grant							150
Mezzanine Fund for Germany							200
Total	**0**	**200**	**500**	**539**	**64**	**1,303**	**350**

1) Deposits.

Table 57 The equity financing contribution of the KfW and the BMWi (own development)

6.5 The main study survey

6.5.1 The survey progress

The survey was carried out immediately after the pilot study in order to reduce the risk of post-hoc recall biases (see section 5.5.1). The survey of the present thesis started on 13 October 2013 and altogether 107 PE and VC firms were invited (see section 5.5.2 and table 22 in section 5.5.2). The sample members received an invitation letter, the questionnaire instructions and a confirmation letter from the university. The whole survey was sent by e-mail and by mail in the case of missing e-mail addresses. The sample members were requested to send their responses by 10 November 2013. As in the case of the pilot study, the sample members were guaranteed absolute privacy and confidentiality. Due to the weak participation, sample members were reminded at altogether three occasions in November 2013, in January 2014 and in February 2014. In the run up of the final reminder, the sample members were contacted by phone on 7 February 2014. This showed that a remarkable proportion of sample members denied to participate not only due to time constraints but also due to language difficulties. Therefore, the questionnaire was translated into German and was finally sent to the sample members. The online data base was closed on 10 April 2014 and at that point the main study was finalised.

The majority of respondents processed the questionnaire via the online link. Those questionnaires which were sent back by fax, e-mail or mail were processed manually. One sample member participated in a telephone interview during the telephone calls on 7 February 2014. The enterprise characteristics of this sample member were stored in the data base for statistic purposes. Due to the semi-structured progress of this interview, it was not possible to consider the content in the online data base. Therefore, the interview results are presented separately in the context of the main study results. The online data base was stored in MS-Excel format which ensured a straightforward data analysis.

During the main study, 30 PE and VC firms indicated that they do not participate on surveys in general due to time constraints and confidentiality concerns. At the end, 25 PE and VC investors participated on the survey. At first, the responses were checked regarding errors, plausibility and completeness. As a result, one questionnaire was not processed due to both plausibility concerns and incompleteness. Finally, 24 questionnaires were considered for the data analysis. This corresponds to a response proportion of 31.2% from the final sample size of 77 enterprises and 22.4% from the initial sample size of 107 enterprises. These results met the earlier expectations (see section 5.5.1) but were clearly under the response rate of the studies from Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). Nevertheless, the response of 22.4% is still within the response proportions of doctoral studies in PE and VC research (Röper 2004; Pankotsch 2005; Sobczak 2007; Kranz 2008; Hoffelner 2010; Wahrenberger 2011; Wexlberger 2011). In that respect, researchers achieved response rates between 18% (Hoffelner 2010) and 31% (Wexlberger 2011).

The subsequent table 58 details the survey response.

The survey statistics	
Status per 10 April 2014	Number
Initial sample	107
Rejections	-30
Final sample	77
Respondents	25
Not processable	-1
Processable	24
Proportion from final total	31.2%
Proportion from earlier total	22.4%
Proportion of rejections	28.0%

Table 58 The survey statistics (own development)

6.5.2 The survey characteristics, the representativity and the biases

Altogether, five independent investors, seven corporate venture capital firms, six public investors and six Mittelständische Beteiligungsgesellschaften participated in the survey. Hence, the responses could be divided in two groups. One group might be classified as more support-oriented and is composed of the Mittelständische Beteiligungsgesellschaften and of the public investors, whereas the remaining group might be classified as more profit and strategic oriented. This group is composed of the independent investors and the corporate venture capitalists (see subsequent table 59).

The main study response statistics		
Type of investor	Respondents	Proportion in %
Independent investor	5	21%
Corporate Venture Capital firm	7	29%
Mittelständische Beteiligungsgesellschaft	6	25%
Public investor	6	25%
Number of participants	24	100%

Table 59 The main study response statistics (own development)

In their majority, the questionnaires were processed from the middle or the top management of the sample members. This employment level, in connection with the employment duration, supported the assumption that the survey results did not suffer from a key informant bias (see subsequent table 60). This type of bias is based on the assumption that respondents have to be experienced and hence be able to provide reliable indications. Assessments in that respect might differ due to the employment level and thus the different perspectives and experiences (Wahrenberger 2011). Even though the invitations of the survey were sent to the top management of the sample members, the questionnaires could have been processed from a lower employment level. In particular, the research area regarding the investment process required sufficient experience and the right perspective. This should be guaranteed as 50% of the respondents belong to the middle management and 45% to the top management of the sample members (see subsequent table 60).

The employment status of the survey respondents				
Status	Lower	Middle	Top	Total
	(Associate)	(Investmentmanager)	(Director, CEO)	
n	1	10	9	20
Proportion	5%	50%	45%	100%
Duration				
Mean	1.0	6.6	15.8	10.2
Median	1.0	5.5	14.5	12.0
Variance	#DIV/0!	19.6	27.1	45.9
Deviation	#DIV/0!	4.4	5.2	6.8

Table 60 The employment status of the survey respondents (own development)

At first, the results showed that the participating firms were founded between 1971 and 2012, and hence seemed suitable to contribute in accordance with the research timeframe. At the time of the survey in 2013, the average age of the sample frame was approx. 18 years. The CVC firms with an average age of approx. 11 years represented the youngest group of investors and the MBGs with an average age of approx. 35 years represented the oldest group of investors (see subsequent table 61).

The age structure of the sample					
n=21					
Type of investor	Independent	CVC	MBG	Public	Total
Respondents	4	6	5	6	21
Median	2002	2004	1972	1998	1998
Max	2012	2012	2002	1999	2012
Min	1989	1990	1971	1990	1971
Range	23	22	31	9	41
Average age at survey moment	12.0	10.7	35.4	16.3	18.4

Table 61 The age structure of the sample (own development)

In their majority, the respondents were focused on investments in Germany and thus the underlying regional focus of the present survey. Only a minor proportion of investors were also concerned with worldwide or investments in Europe. The MBGs and the public investors were exclusively operating in Germany (see subsequent table 62).

The regional investment focus				
n=24 (multiple selection)				
Regional focus	Germany	Europe	World	Total
Type of investor				
Independent	2	3	0	5
CVC	5	0	2	7
MBG	6	0	0	6
Public	6	0	0	6
Responses	19	3	2	24
Proportion	79%	13%	8%	100%

Table 62 The regional investment focus (own development)

Furthermore, the survey respondents were focused on early-stage investments in the seed, the start-up and the expansion phase. Only a minor proportion of investors were also concerned with bridge, replacement and turnaround investments. These financing purposes were either provided by the Mittelständische Beteiligungsgesellschaften or the public PE and VC firms, which were also concerned with MBO and MBI investments (see subsequent table 63).

The financing purpose						
n=23 (multiple selection)						
Type of investor	Independent	CVC	MBG	Public	Responses	In %
Financing purpose						
Expansion	4	4	6	5	19	83%
Start-up	5	5	5	3	18	78%
Seed	3	4	2	3	12	52%
MBO/MBI	0	1	6	5	12	52%
Bridge/Replacement	0	0	3	2	5	22%
Turnaround	0	0	2	1	3	13%

Table 63 The financing purpose (own development)

At survey moment in 2013, the majority of respondents preferred minority and silent investments. Every participating MBG realised silent investments according to their central business model (see subsequent table 64). Beside this concentration on minority and silent investments, the majority of respondents were also focused on smaller volume investments. In that respect, approx. 65% of the respondents indicated that their investment volumes were not bigger than 1.5 million euros per deal at survey moment. The remaining third of the respondents were focused on medium-sized investments between 1.5 and 25 million euros per deal. No investor realised investments which were bigger than 25 million euros per deal (see table 65). In that context, research results showed that the majority of respondents kept these basic investment classes overall unchanged (see table 66).

The type of investment at survey moment						
n=23 (multiple selection)						
Type of investor	Independent	CVC	MBG	Public	Responses	In %
Type of investment						
Minority investments	4	6	3	6	19	83%
Silent investments	1	3	6	4	14	61%
Open investments	2	3	1	2	8	35%
Majority investments	2	1	0	1	4	17%

Table 64 The type of investment at survey moment (own development)

The investment classes at survey moment					
Classification	From	To	Responses	Proportion	Cumulated
	in TEUR				
1	100	499	4	17%	17%
2	500	1,500	11	48%	65%
3	1,501	4,999	5	22%	87%
4	5,000	14,999	2	9%	96%
5	15,000	25,000	1	4%	100%
6	25,001		0	0%	
n			23	100%	

Table 65 The investment classes at survey moment (own development)

The progress of investment classes between 2010 and 2012		
	Responses	Proportion
Progress		
Unchanged	13	65%
Increased	4	20%
Decreased	3	15%
n	20	100%

Table 66 The progress of investment classes between 2010 and 2012 (own development)

The survey respondents also indicated that they were focused on investments in enterprises between seven million euros and approx. 176 million euros on annual turnovers at the moment of the survey in 2013. Even though these average results have a strong deviation at the maximum boarder, the median results underline the focus of the sample respondents on SME investments (see subsequent table 67). The results for the MBGs were quite similar. Turnovers of their portfolio varied between nine million euros and 185 million euros with a large deviation at the maximum boarder too. The median on the other hand also underlined the basic orientation of the MBGs on SME investments (see table 89 in appendix O). In that context, the majority of respondents indicated that the turnover requirements of potential investments neither decreased nor increased during the post-crisis phase. This basically applied for the minimum and maximum turnover thresholds even though approx. one third of the respondents indicated increasing turnover requirements on the maximum boarder (see table 68). The results for the MBGs in that

respect showed increasing turnover thresholds at the maximum level, which applied at least for the half of the respondents (see table 90 in appendix O)**.**

The turnover thresholds of investment targets		
Total sample		
n=19	Minimum	Maximum
	turnover in MEUR	
Max	17	643
Min	1	3
Range	16	640
Median	6.5	50.0
Mean	7.0	175.9
Variance	41.2	51,543.6
Deviation	6.4	227.0
Responses	6	13

Table 67 The turnover thresholds of investment targets (own development)

The development of turnover thresholds between 2010 and 2012			
Total sample			
n=17	Minimum turnover		
	Decreased	Increased	Unchanged
Responses	2	1	14
Proportion	12%	6%	82%
	Maximum turnover		
	Decreased	Increased	Unchanged
Responses	1	5	11
Proportion	6%	29%	65%

Table 68 The development of turnover thresholds between 2010 and 2012 (own development)

At the moment of the survey in 2013, the participating investors were focused on investments in the mechanical and industry automation sector, the information technology and software sector, and on investments in the area of electronics. On the other hand, investments in the logistics sector, the service sector and in enterprises of the financial services sector were of minor relevance (see subsequent table 69).

The selection of industry branches		
n=23 (multiple selection)		
Type of industry branch	Responses	Proportion
Mechanics/Industry automation	18	78%
Software/IT	18	78%
Electronics	16	70%
Pharmacy/Medicine/Biotech	14	61%
Telco/Internet	14	61%
Energy/Water/Environment	13	57%
Chemistry	12	52%
Consumer goods and retail	9	39%
Logistics	7	30%
Services including consulting	7	30%
Financial Services	5	22%
Other (advanced materials)	1	4%

Table 69 The selection of industry branches (own development)

With regard to the representativity of the results, at this point it is clarified again that this survey was carried out in order to examine the developments in Germany's PE and VC market during the post-crisis phase of 2010, 2011 and 2012. The sample frame based on a purposive selection of early-stage and of public investors without family offices and business angels. Due to the lack of complete and comprehensive directories regarding market members in Germany, a complete description of early-stage and of public investors could not be ensured. Thus, the survey results could neither claim to be representative for the entire PE and VC market nor regarding early-stage investments (see section 5.5.2). In that respect, the results showed that the average proportion of survey respondents total investment volume for 2010 to 2012 (see table 73 in section 6.5.3) in relation to the entire market in Germany (InvestEurope 2016) was 7.1% and thus surely not representative. This assumption was underlined by the average proportion of sample respondents total number of investments (see table 71 in section 6.5.3) which on average was 34.5% in relation to the entire market in Germany during 2010, 2011 and 2012 (InvestEurope 2016).

Nevertheless, the initial description of the survey respondents regarding their regional investment focus (see table 62), their financing purposes (see table 63), the type of equity investment (see table 64), the investment classes (see table 65) and the turnover thresholds of investment targets (see table 67) supported the assumption that the results were suitable to

describe the developments in early-stage and smaller volume financing from public investors, semi-public investors and from VC firms in Germany during 2010 to 2012.

6.5.3 The survey results

At first, the survey results showed that both the number of portfolio companies and the number of investments were decreasing between 2010 and 2012 (see subsequent tables 70 and 71). On the other hand, the total fund volumes were increasing significantly (see table 72), while the investment volume was increasing only slightly between 2010 and 2012 (see table 73). On the level of the MBGs, the number of portfolio companies was increasing between 2010 and 2012 (see table 91 in appendix O), while the number of investments was decreasing (see table 92 in appendix O). On the other hand, both their fund volume and investment volume (see tables 93 and 94 in appendix O) remained rather stable during 2010 to 2012. The main difference between the entire responses and the MBGs were there significantly smaller investment amounts (see table 95 in appendix O and table 74 in section 6.5.3).

The number of portfolio companies			
Total sample			
Year	2010	2011	2012
Total	2,727	2,779	2,836
Max	1,101	1,109	1,095
Min	7	7	7
Range	1,094	1,102	1,088
Median	31.0	34.0	26.5
Mean	143.5	146.3	128.9
Variance	73,714.7	74,980.6	65,724.2
Deviation	271.5	273.8	256.4
n	19	19	22

Table 70 The number of portfolio companies (own development)

The number of investments			
Total sample			
Year	2010	2011	2012
Total	471	442	445
Max	151	156	127
Min	1	1	0
Range	150	155	127
Median	6.0	5.0	7.0
Mean	24.8	23.3	21.2
Variance	1,974.5	1,883.8	1,345.2
Deviation	44.4	43.4	36.7
n	19	19	21

Table 71 The number of investments (own development)

The total fund volume in MEUR			
Total sample			
Year	2010	2011	2012
Total	1,560	1,662	2,390
Max	600	600	600
Min	10	10	10
Range	590	590	590
Median	75.0	97.0	100.5
Mean	104.0	110.8	132.8
Variance	20,735.8	20,773.7	22,327.2
Deviation	144.0	144.1	149.4
n	15	15	18

Table 72 The total fund volume in MEUR (own development)

The total investment volume in MEUR			
Total sample			
Year	2010	2011	2012
Total	387	431	459
Max	80	80	100
Min	2	1	2
Range	78	79	98
Median	14.7	14.0	9.9
Mean	24.2	26.9	25.5
Variance	607.9	796.2	913.6
Deviation	24.7	28.2	30.2
n	16	16	18

Table 73 The total investment volume in MEUR (own development)

The results, moreover, showed that these average investment volumes were increasing both on the level of the MBGs (see table 95 in appendix O) and on the level of the entire sample (see subsequent table 74) during the post-crisis phase. Investment volumes increased by 17.11% on the level of the entire sample and by 9.1% on the level of the MBGs respectively.

The average investment volume per deal in MEUR			
Total sample			
Year	2010	2011	2012
Average investment volume	24.2	26.9	25.5
Average number of investments	24.8	23.3	21.2
Average investment volume per deal	0.976	1.155	1.203

Table 74 The average investment volume per deal in MEUR (own development)

The survey results also showed that 50% of the respondents considered public funding for their investments during the post-crisis phase, whereas the remaining 50% did not (see subsequent table 75).

The application of public funding between 2010 and 2012		
Total sample		
	Responses	Proportion
Frequency		
Never	10	50%
Sometimes	5	25%
Often	3	15%
Seldom	2	10%
Always	0	0%
n	20	100%

Table 75 The application of public funding between 2010 and 2012 (own development)

Furthermore, the survey participants indicated that parts of their investments were syndicated. In relation to the number of investments, this syndication proportion was slightly increasing from 58.1% in 2010 to 61.1% in 2012 (see subsequent table 76).

The proportion of syndicated investments			
Total sample			
Year	2010	2011	2012
Max	100	100	100
Min	20	20	17
Range	80	80	83
Median	50.0	50.0	55.0
Mean	58.1	56.8	61.1
Variance	906.3	913.6	994.1
Deviation	30.1	30.2	31.5
n	15	15	16

Table 76 The proportion of syndicated investments (own development)

The syndication proportion on the level of the MBGs on the other hand resulted in on average 42.5% each in 2010, 2011 and 2012 (see table 96 in appendix O).

With regard to the number of received business proposals, survey results showed an increasing number from on average 304 proposals in 2010 to approx. 342 proposals in 2012. This was an increase of approx. 12.3% during the post-crisis phase. The detailed analysis in that respect showed that this number was biggest on the level of the corporate venture capitalists and on the

level of the independent investors. On the other hand, this number was significantly smaller on the level of the Mittelständische Beteiligungsgesellschaften and smallest on the level of the public investors. The increase in the amount of business proposals on the other hand, was largest on the level of the public investors with an increase of approx. 38.1% and smallest on the level of the MBGs with an increase of approx. 8.1% during the post-crisis phase (see subsequent table 77).

The results, moreover, showed that the investment proportion of investors was increasing from on average 5.5% in 2010 to on average 6.6% in 2012. This corresponds with an increase of approx. 20% during the post-crisis phase. The detailed view showed that the increase was largest on the level of the MBGs with approx. 55.9%, smallest on the level of the public investors with an increase of approx. 16.7% and a decreasing investment proportion of approx. 23.8% on the level of the corporate venture capitalists. By dividing the sample in two groups, namely more support-oriented on the one hand and more strategic and profit-oriented on the other hand (see section 6.5.2), the group of supporters with the MBGs and the public investors realised significantly larger investment proportions in comparison to the remaining group. Nevertheless, the general interpretation of increasing investment proportions during the post-crisis phase was difficult in accordance with the median results. The deeper analysis showed that the significant increase of the mean values between 2011 and 2012, was caused from extreme values in 2012 (see subsequent table 77).

The business plan statistics						
	Total number received			Proportion on investments		
Year	2010	2011	2012	2010	2011	2012
Type of investor						
Total sample						
Median	235.0	248.5	195.0	5.0	4.5	5.0
Mean	304.2	323.1	341.5	5.5	5.6	6.6
Deviation	259.1	286.2	323.5	3.7	4.8	6.5
n	18	18	20	18	18	19
Independent						
Median	400.0	450.0	500.0	2.0	1.0	1.5
Mean	352.5	377.5	403.8	2.3	1.3	3.3
Deviation	260.2	258.2	263.4	1.5	0.6	4.6
n	4	4	4	3	3	4
CVC						
Median	600.0	600.0	500.0	4.5	3.0	3.5
Mean	554.0	601.4	607.5	4.2	3.3	3.2
Deviation	217.0	272.0	378.1	1.2	1.5	1.9
n	5	5	6	6	6	6
MBGs						
Median	176.0	160.5	158.5	10.5	11.5	15.5
Mean	250.3	250.0	270.5	9.3	10.8	14.5
Deviation	188.7	201.3	240.1	2.9	4.2	7.9
n	4	4	4	4	4	4
Public investors						
Median	45.0	54.0	52.5	6.0	6.0	6.0
Mean	58.8	59.6	81.2	6.0	6.8	7.0
Deviation	48.0	41.9	72.2	5.0	5.8	5.6
n	5	5	6	5	5	5

Table 77 The business plan statistics (own development)

With regard to the acquisition of deals, the survey results showed that banks and the network of PE and VC firms were the most important deal sources during the post-crisis phase. On the other hand, chambers of commerce, federations and auctions were of minor relevance. Results also

showed a strikingly declining trend of universities as an acquisition channel during the post-crisis phase (see subsequent table 78).

The ranks of deal sources			
Rank/Year	2010	2011	2012
1	Bank	Bank	Bank
2	Network	Network	Network
3	Other source	Other source	Other source
4	University	Consultant	PE/VC-firm
5	Consultant	University	Consultant
6	Auction	PE/VC-firm	University
7	PE/VC-firm	Auction	Auction
8	CoC/federation	CoC/federation	CoC/federation
n	14	15	19

Table 78 The ranks of deal sources (own development)

Moreover, the survey results showed that at the moment of the survey in 2013, the management team, the strategy, the market and competition, and the product and service were the most important review fields in the initial screening of business proposals. On the other hand, the organisation of the enterprise was of minor importance at that step in the decision making process (see subsequent table 79). The results of the MBGs were rather identical with a larger relevance of the market and the competition (see table 97 in appendix O).

In that context, the survey results also showed that this basic review orientation at the moment of the survey in 2013, also applied for the post-crisis phase of 2010, 2011 and 2012. The survey respondents indicated that they had not changed their emphasis regarding the review fields during the initial screening. Although, 42% of the respondents indicated a stronger emphasis on the management team, the majority of respondents kept their basic orientation unchanged during the post-crisis phase (see table 80).

The business plan components' relevance at survey moment				
Total sample				
(Scale: 1 less important to 5 very important)				
Review field	n	Rank	Mean	Deviation
Management team	22	1	4.8	0.7
Strategy	22	2	4.3	1.1
Market & Competition	22	2	4.3	0.7
Product & Service	22	3	4.2	0.7
Marketing & Sales	22	4	3.8	0.8
Financial forecast	22	5	3.7	0.9
Research & Development	22	6	3.6	0.7
Human resources	22	6	3.6	0.9
Finance & Controlling	22	6	3.6	1.1
Completeness & Coherence	21	6	3.6	0.8
Organisation	22	7	3.4	0.8

Table 79 The business plan components' relevance at survey moment (own development)

The business plan components' development between 2010 and 2012				
Total sample				
Review field's importance	n	Decreased	Increased	Unchanged
Management team	19	0%	42%	58%
Marketing & Sales	19	5%	26%	68%
Strategy	19	0%	21%	79%
Product & Service	19	0%	21%	79%
Human resources	19	0%	21%	79%
Financial forecast	19	5%	16%	79%
Finance & Controlling	19	5%	16%	79%
Market & Competition	19	0%	11%	89%
Research & Development	19	0%	11%	89%
Completeness & Coherence	19	5%	5%	89%
Organisation	19	11%	0%	89%

Table 80 The business plan components' development between 2010 and 2012 (own development)

The MBGs in their majority indicated an unchanged assessment of components significance too. Interestingly enough, some of the participating MBGs strengthened their reviews regarding human resources, and finance and controlling (see table 98 in appendix O). These review priorities during the initial screening were identical with the results for the due diligence. At the time of the survey in 2013, the management team, the strategy, and the product and service were the most important review fields during the due diligence. As in the case of the business plan

screening, the organisation of the enterprise was of minor interest during the due diligence too (see subsequent table 81). This entire perspective of the survey results also applied for the MBGs (see table 99 in appendix O).

The due diligence components' relevance at survey moment				
Total sample				
(Scale: 1 less important to 5 very important)				
Review field	n	Rank	Mean	Deviation
Management team	21	1	4.7	0.7
Strategy	21	2	4.4	0.7
Product & Service	21	3	4.3	0.9
Marketing & Sales	21	4	3.9	0.8
Finance & Controlling	21	5	3.8	0.8
Research & Development	21	6	3.4	0.8
Human resources	21	6	3.4	1.2
Organisation	21	7	3.3	0.8

Table 81 The due diligence components' relevance at survey moment (own development)

The majority of survey respondents did not indicate changes regarding the review fields on the level of the due diligence during the post-crisis phase. Nevertheless, 44% of the respondents mentioned a stronger emphasis on the management team and 28% on marketing and sales (see subsequent table 82). On the level of the MBGs, 40% of the survey respondents indicated a stronger emphasis on the management team, and on finance and controlling (see table 100 in appendix O).

The survey results also showed that in the case that negotiations were broken off, particular contract rights were of minor importance. The most important reason was that finally no investor realised the deal, with a slightly decreasing proportion between 2010 and 2012. On the other hand, the proportion of deals which were finally realised by a competitor was increasing between 2010 and 2012 (see table 83).

The DD components' development between 2010 and 2012				
Total sample				
Review field's importance	n	Decreased	Increased	Unchanged
Management team	18	0%	44%	56%
Marketing & Sales	18	0%	28%	72%
Product & Service	18	0%	22%	78%
Strategy	18	0%	17%	83%
Finance & Controlling	18	6%	17%	78%
Research & Development	18	0%	11%	89%
Organisation	18	11%	6%	83%
Human resources	18	11%	0%	89%

Table 82 The DD components' development between 2010 and 2012 (own development)

The proportion of break-off reasons in 2010, 2011 and 2012				
Proportions in %	No investor realised the deal	Other reasons not specified	Deal finalised by competitor	Particular contract right
Year 2010				
Responses	12	10	8	8
Mean	51.3	31.5	23.8	22.5
Median	47.5	30.0	12.5	10.0
Deviation	26.9	18.3	20.8	25.9
n=13				
Year 2011				
Responses	12	10	8	8
Mean	47.5	34.8	24.6	23.1
Median	45.0	41.5	12.5	10.0
Deviation	25.0	18.0	22.6	25.9
n=13				
Year 2012				
Responses	15	13	10	10
Mean	48.7	29.2	28.5	20.5
Median	50.0	25.0	22.5	10.0
Deviation	25.5	16.9	22.5	23.5
n=16				

Table 83 The proportion of break-off reasons in 2010, 2011 and 2012 (own development)

With regard to the post-investment phase, the results showed that investors at the moment of the survey in 2013, were most often involved in board establishment, finance and controlling, and

strategy development (see subsequent table 84). The differences in the degree of involvement between each of these areas were rather small. In that respect, the results on the level of the MBGs showed that this type of investor was overall less often involved in portfolio company's mentoring and monitoring (see table 101 in appendix O). This should be considered in the context of their smaller investment volumes per deal (see table 95 in appendix O) and their focus on minority and silent investments (see table 64 in section 6.5.2). In the case of their involvement, the results showed that they were focused on finance and controlling rather than on board establishment or strategy development. In that respect, there was an obvious difference in the degree of involvement between the first and the subsequent monitoring and mentoring areas on the level of the MBGs (see table 101 in appendix O). Even though the majority of respondents indicated that their involvement was not increasing during 2010 to 2012, anyhow approx. one third of the respondents indicated an increasing involvement during the post-crisis phase. This applied for the entire survey respondents and for the MBGs. On the other hand, no sample member indicated a decreasing involvement (see table 85).

The monitoring and mentoring in 2013				
Total sample				
(Scale: 1 not involved to 5 always involved)				
Monitoring/Mentoring area	n	Rank	Mean	Deviation
Board establishment	21	1	3.6	1.2
Finance & Controlling	21	2	3.5	0.7
Strategy development	21	3	3.4	1.0
Management recruitment	21	4	3.1	1.2
Management coaching	21	5	2.7	1.2
Marketing & Sales	21	6	2.6	1.1
Human resources	21	6	2.6	1.2
Strategy implementation	21	6	2.6	0.9
Procurement & Production	21	7	2.0	0.9

Table 84 The monitoring and mentoring in 2013 (own development)

Investors involvement between 2010 and 2012				
Total sample				
Involvement:		Decreased	Increased	Unchanged
n	20	0	6	14
Proportion		0%	30%	70%
MBGs				
n	6	0	2	4
Proportion		0%	33%	67%

Table 85 Investors involvement between 2010 and 2012 (own development)

The results with regard to investor's exit, moreover, showed that buy-backs by investors was the most important exit channel each in 2010, 2011 and 2012. This proportion of buy-backs considers the repayments of silent investments. Therefore, this result was distorted due to the large proportion of repayments of the silent investments on the level of the MBGs and the public investors. On the other hand, trade sales were an important exit channel for the survey respondents in each year of the post-crisis phase too. This proportion was decreasing between 2010 and 2012, whereas the proportion of total losses was significantly increasing in accordance with the economic development. IPOs on the other hand played a minor role during the entire post-crisis phase (see subsequent table 86). These results should be considered in the context of the economic development during the post-crisis phase, with the significant increases of 4.2% in 2010 and 3% in 2011, and the small increase of 0.7% in 2012 (Destatis 2013).

The survey results finally showed that the implementation of Basel III had no effect on the selection of industry sectors. Particular industry sectors were neither preferred nor disadvantaged during the selection process. However, one MBG indicated that the implementation of Basel III resulted in the consideration of additional industry sectors (see table 87). With regard to the effects of the AIFM-directive, the majority of survey respondents indicated that the transformation of the directive in national law had no influence on the initial screening, the due diligence or the monitoring of the portfolio companies (see table 88).

The proportions of exit channels					
Exit channel	Trade sale	Secondary purchase	IPO	Buy-back	Total loss
Year 2010					
Responses	10	3	2	12	11
Mean	41.0	5.3	50.0	55.3	19.1
Median	30.0	5.0	50.0	60.0	10.0
Deviation	34.8	4.5	35.4	37.4	19.2
n=14					
Year 2011					
Responses	9	2	0	12	10
Mean	45.6	7.5	#DIV/0!	65.8	18.5
Median	35.0	7.5	#Number!	80.5	10.0
Deviation	38.9	3.5	#DIV/0!	32.5	20.9
n=14					
Year 2012					
Responses	8	4	1	13	13
Mean	33.8	31.3	30.0	53.4	29.3
Median	27.5	30.0	30.0	50.0	10.0
Deviation	25.2	27.8	#DIV/0!	32.9	35.5
n=15					

Table 86 The proportions of exit channels (own development)

The effects of the Basel III implementation			
n=18			
Effect	Additional sectors are considered	Specific sectors are disregarded	Overall no effect
Responses	1	0	17
Proportions	6%	0%	94%

Table 87 The effects of the Basel III implementation (own development)

The impacts of the AIFM transformation				
n=14 (multiple selection)				
Process step	Deal selection	Due Diligence	Monitoring	Open category
Impact no	14	14	13	
Impact yes	0	0	1	reporting

Table 88 The impacts of the AIFM transformation (own development)

6.5.4 The comparison analysis for the public and the semi-public investors

By dividing the survey responses into two groups, namely public and semi-public investors on the one hand and more strategic and profit-oriented investors on the other hand (see table 59 in section 6.5.2) the survey delivered the following results.

Initially, the results showed that both groups of investors preferred minority investments at the moment of the survey in 2013. In addition, these results showed that public and semi-public investors were focused on silent investments rather than on open investments (see table 64 in section 6.5.2 and table 102 in appendix P).

With regard to investors' investment classes, the results showed that 58% of the participating public and semi-public investors were focused on investments between 500 TEUR and 1.5 MEUR per deal. On the other hand, the results showed that the more strategic and on profit-oriented investors were either focused on investments between 500 TEUR and 1.5 MEUR per deal or on investments between 1,501 TEUR and 4,999 TEUR per deal (see table 103 in appendix P).

The results, furthermore, showed that public investors were focused on the mechanics and the industry automation sector, the software and the IT sector and also on the electronics sector. The MBGs on the other hand virtually covered almost every type of industry branch. With regard to the remaining group of more strategic and profit-oriented investors, the results so far showed a relative specialisation rather than a focus on a specific industry branch (see table 104 in appendix P).

The results also showed that the portfolio on the level of the public and semi-public investors was significantly larger compared to the remaining group of investors. The portfolio counted on average 227 enterprises per year during the post-crisis phase in comparison to an average of 32 enterprises per year on the level of the more strategic and profit-oriented investors (see table 105 in appendix P). In that context, the results showed that the number of investments on the level of the public and semi-public investors in comparison to the remaining sample group was significantly larger during the post-crisis phase too. The results showed that this type of investor realised an average of 39 investments per year in comparison to an average of seven investments per year on the level of the more strategic and profit-oriented investors (see table 106 in

appendix P). Both differences were due to the significantly larger number of portfolio companies and investments from the MBGs.

With regard to investors' fund volumes, the results showed that the funds of the public and semi-public investors with an average volume of 88 MEUR per year were significantly smaller in comparison to the fund volumes of the more strategic and profit-oriented investors with on average 147 MEUR per year during the post-crisis phase (see table 107 in appendix P). The investment volumes between both sample groups differed significantly too. The results in that respect showed that the public and the semi-public investors invested on average 16 MEUR per year during the post-crisis phase, whereas the remaining group invested on average 45 MEUR per year during the same period (see table 108 in appendix P).

With regard to the syndication behaviour, the results showed that the public and semi-public investors syndicated on average 43% of their investments per year in comparison to an average proportion of 76% per year on the level of the remaining sample group. These proportions were slightly increasing between 2010 and 2012 (see table 109 in appendix P).

As already indicated in section 6.5.3, the number of received business proposals was significantly larger on the level of the more strategic and profit-oriented investors, whereas their investment proportion was significantly smaller in comparison to the public and semi-public investors (see table 77 in section 6.5.3).

The results, moreover, showed that the management team, the strategy, the market and competition, and the product and service were the most important review fields during the initial screening. This applied for both sample groups (see table 110 in appendix P). With regard to the detailed screening, the management team, the strategy and the product and service were the most important review fields at the moment of the survey in 2013. This applied for both sample groups too (see table 111 in appendix P).

On the level of the negotiation phase, the results showed that particular contract rights as a break-off reason were of minor relevance for the public and semi-public investors in comparison to the remaining sample group. This applied to every year during the post-crisis phase (see table 112 in appendix P).

With regard to monitoring and mentoring, the results initially showed that the group of public investors were most often concerned with finance and controlling rather than with board establishment as in the case of the more strategic and on profit-oriented investors. On the other hand, both sample groups indicated a strong focus on strategy's development regarding their portfolio companies (see table 113 in appendix P).

With regard to the exit phase, the results showed that differences between the sample groups were associated with the larger proportion of buy-backs and repayments of the silent investments on the level of the public and semi-public investors. On the other hand, trade sales were of importance for the remaining sample group, whereas secondary purchases were of the least importance for the entire survey respondents (see table 114 in appendix P).

6.5.5 The interview result

The interview was carried out on 7 February 2014 with the chief executive officer of the firm. The interview content is not completely reproduced as some indications were outside the subjects of the present thesis.

This investor was mainly focused on silent investments in order to improve the equity basis of enterprises. The interviewee in that context mentioned that they were not exclusively focused on technology-based investments, as a so-called Bill Gates investment strategy alone would not guarantee sufficient profits for the investor. On the other hand, the importance of silent investments was increasing during the past periods which would underline the stronger profit orientation of the firm. This investor was not solely refinanced by equity of the mother company and the accumulation of capital gains but also by mother company loans. In that context, the interviewee pointed out that nowadays it has become very difficult to receive public guarantees for PE and VC investments. This would explain why the solvency and hence the repayment ability of enterprises would have an absolute priority in the selection of portfolio companies. Therefore, this investor was much more focused on future cash-flows than on the earlier profit and loss statements. This sample member also underlined the relevance of the management team both during the initial and the detailed screening. The interviewee emphasised his indication when he stated that an investor is financing the three m, namely the management team, the management team and the management team. On some occasions, this investor also appointed additional management audits during the decision making process. In that context, the

interviewee explained that the relevance of the commercial management stepped back since the financial crisis. The emphasis now would be on the operational management due to its responsibility for innovation and revenues. Furthermore, a stronger emphasis would also be on the market and the technology. With regard to monitoring and mentoring, the interviewee finally stated that the reporting is requested half yearly and that the financial crisis had no impact regarding this reporting periods.

At this point, the presentation of the survey results is finalised. The subsequent sections are initially concerned with the analysis results of the BVK publications, the validation study and finally with the conclusions.

6.6 The analysis results of the BVK publications

The analysis of the BVK publications was initially carried out between October 2014 and January 2015. A final recheck was then carried out during December 2015. The examination was focused on the AIFM-directive, Basel III and the investment process in order to expand the survey results. Additional findings were considered in a residual category (see table 40 in section 5.6.6). Altogether, 40 publications from Germany's PE and VC association (see table 30 in appendix L.2) were reviewed. These publications are classified in the subsequent table 115. The final review showed that eight of the 40 publications did overall not contribute to the examination in any way.

The classification of the BVK publications				
Type of publication/Year	2010	2011	2012	**Total**
Annual report	1	1	1	**3**
Investor information	1	1	1	**3**
Private-Equity letter	4	3	3	**10**
Press releases	9	6	9	**24**
Total publications	**15**	**11**	**14**	**40**
Proportion	37.5%	27.5%	35.0%	100.0%

Table 115 The classification of the BVK publications (own development)

The review, furthermore, showed that the AIFM-directive was mentioned in 17 publications, the issue of Basel III in three publications and the components of the investment process in seven

publications. In that respect, the issue of deal acquisition was mentioned in one publication and the issue of the exit in six publications. There were no additional indications regarding the remaining components of the investment process. With regard to the residual category and in terms of a quantification, the review also showed that the issue of fundraising was mentioned in 14 publications. The subsequent table 116 details the number of publications in relation to the examination categories.

The frequencies of the examination categories	
Examination category	Frequency
Financial market regulation:	
AIFM-directive	17
Basel III	3
Investment process:	
Deal acquisition	1
Deal screening	0
Negotiation and contracting	0
Monitoring and mentoring	0
Exit	6
Residual category:	
Fundraising	14

Table 116 The frequencies of the examination categories (own development)

6.6.1 The analysis results regarding the AIFM-directive and Basel III

With regard to the AIFM-directive, the subsequent figure four initially presents the progress from an AIFM proposal until the transformation into a national law in Germany.

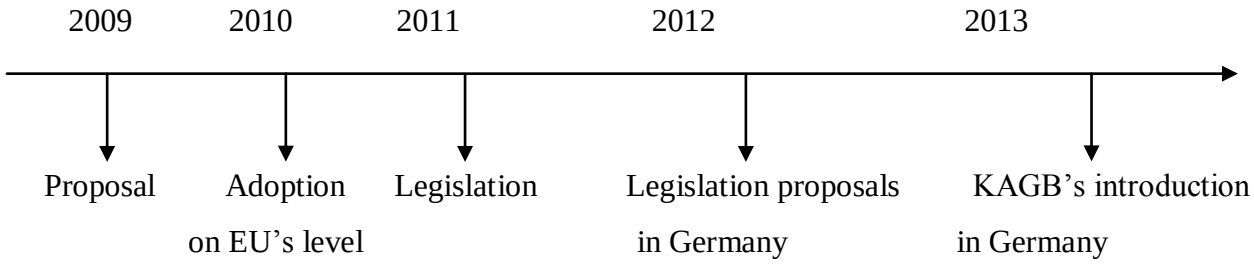


Figure 4 The implementation of the AIFM-directive
(derived from BVK 2010a; BVK 2011a; BVK 2012a; BVK 2013a)

The German term of the AIFM-directive in that context is the so-called Kapitalanlagegesetzbuch. The review showed that the transformation of the AIFM-directive into a national law, out of federations point of view, was regarded as a chance to create an international competitive legal framework for equity investors in Germany. The federation in that context criticised the lack of a specific PE and VC law in Germany on the one hand and the regulation of the market by several individual laws on the other hand. The review showed that the AIFM-directive was assessed positively on 14 different occasions in the text material. This basic assessment was associated with reference to the establishment of a competition framework on ten occasions and with reference to an appropriate tax regulation on two occasions. The review also showed that the transformation of the AIFM-directive into national law during the post-crisis phase was assessed negatively on seven occasions. These negative assessments referred to the possibility of overregulation, the disproportionate burden of smaller PE and VC firms, the disadvantage of PE and VC firms due to reporting requirements, and the introduction of a product regulation. This product regulation was concerned with the prohibition for parts of the investors to invest in PE and VC funds. The German legislation proposal regarding AIFM related tax adjustments was assessed overall negatively on two occasions due to additional tax burdens. The subsequent table 117 summarises the assessments regarding the transformation of the AIFM-directive.

The assessment of the AIFM-directive		
Context	Assessment	Frequency
AIFM-directive	positive	14
	negative	7
German legal framework	positive	10
German tax framework	positive	2
German AIFM related tax law	positive	0
	negative	2

Table 117 The assessment of the AIFM-directive (own development)

The review also showed that the AIFM-directive was discussed in one of four BVK working groups, across working group meetings and in federation's legal advisory board during 2010. In 2011, the AIFM-directive was discussed in three of four working groups and also across the working group meetings. In 2012, the AIFM-directive was discussed in three of four working

groups. The review did not result in additional findings regarding the effect of the AIFM-directive on the selection, the due diligence and the monitoring process of PE and VC investors.

With regard to Basel III, the review showed that this issue was picked out as a central theme during the federation's so-called equity-day in 2011. Future predictions regarding effects of the Basel III transformation resulted in the assumption of a larger number of bank syndication partners and smaller credit amounts for PE buy-outs. Furthermore, it was also supposed that PE investments which are co-financed by banks would require a stronger collateralisation. It was, furthermore, assumed that Basel III would intensify the process of capital acquisition due to investor's risk awareness and smaller investment proportions. Out of a federations point of view, Basel III and Solvency II would also disadvantage VC investments due to the payment of risk premiums. In that context, it was criticised that state financing by banks would not result in risk premiums due to Basel III. The review did not result in findings regarding the effect of Basel III on the consideration of industry branches. The issue of Basel III was not discussed in any of the federation's working groups during the post-crisis phase.

6.6.2 The analysis results regarding the investment process

The review did not result in significant findings regarding the investment process. The indications in the publications regarding the deal acquisition referred to an event which was organised by the BVK to support the deal acquisition of VC investors. PE and VC firms investment process was not discussed in any of the BVK working groups. Exits, on the other hand, were discussed across working group meetings regarding exit chances in 2010.

6.6.3 The analysis results in the residual category

With regard to the issue of fundraising, the review showed that the fundraising success during each year of the post-crisis phase was accessed negatively six times and positively four times. The publications in that respect showed that the market suffered from declining fundraising volumes in 2010 compared to 2009. In 2011, the market benefited from increasing fundraising volumes which declined significantly in 2012 again. The review in terms of a quantification did not result in additional worth mentioning subjects which should be considered in the residual category.

6.7 The validation study

A validation study was finally carried out in order to verify the results of the survey. This validation study was focused on the investment process, Basel III and the AIFM-directive.

6.7.1 The validation study procedure

The validation study started on 4 November 2015 and altogether 37 PE and VC investors (see table 41 in section 5.7) were invited to participate. The sample frame of the validation study was based on a purposive selection of sample members from the main study sample frame (see section 5.5.2 and appendix L.1). Sample members received an invitation letter (see appendix Q.1), the main study results (see appendix Q.2) and a confirmation letter from the university. Due to the experiences regarding the use of English during the main study (see section 6.5.1), both the results and the invitation letter were sent in German. In order to achieve a large response rate, the validation study was sent by mail including a stamped return envelope. The main study in that respect had shown that it is rather difficult to achieve a sufficient response rate by an exclusively online-based survey. In total, 84 investment managers, investment directors and chief executive officers from 37 PE and VC firms were contacted in order to receive a coordinated response. In the case that a sample member maintained different investment divisions for early-stage and for the remaining investment purposes, the responsible investment managers in these different divisions were invited separately. Two reminders, one per e-mail and one by phone were carried out during the validation study. Five investors denied to participate due to time constraints and an overload of surveys. Finally, 21 responses from 19 investors returned until 31 December 2015. Four of these responses belonged to two investors with separate divisions and hence separate invitations.

The responses were consecutively numbered and checked regarding errors, plausibility and completeness. This showed that two responses from one sample member could not be processed due to inconsistent answers. These two questionnaires were excluded from the further analysis and from the response statistics. On the other hand, the remaining double indication was counted twice in the response statistics, as the responses belonged to two different departments of one investor. This corresponded with a response proportion of 59.4% from the final sample frame and a proportion of 51.4% from the initial sample frame. The validation survey statistic is summarised in the subsequent table 118.

The response statistics of the validation study	
Status per 31 December 2015	Number
Initial sample	37
Rejections	-5
Final sample	32
Responses	21
Not processable	-2
Processable	19
Proportion from final total	59.4%
Proportion from earlier total	51.4%
Proportion of rejections	13.5%

Table 118 The response statistics of the validation study (own development)

This survey was completely paper-based and did without an online tool for data collection purposes. Therefore, each questionnaire was manually recorded in MS-Excel tables for the further analysis.

6.7.2 The characteristics of the validation study

The largest group of respondents was represented by the public investors and by the MBGs. This part of the sample, which could be classified as more support-oriented, represented 74% of the entire responses. This was an obvious overrepresentation in comparison to the more strategic and profit-oriented investors which represented the remaining 26% (see subsequent table 119).

The validation study respondents		
Type of investor	Responses	Proportion
Independent investor	4	21%
Corporate Venture Capital firm	1	5%
Mittelständische Beteiligungsgesellschaft	6	32%
Public investor	8	42%
Total respondents	**19**	**100%**

Table 119 The validation study respondents (own development)

This response proportion was also an overrepresentation of the public and of the semi-public investors in relation to the main study responses (see table 59 in section 6.5.2).

In order to receive rather unbiased validation study results, an appropriate response level was required. The subsequent table 120 shows that 74% of the participants belonged to the top-management and the remaining 26% to the middle-management of the respective enterprise. These employment levels were regarded as suitable to validate the main study results.

The employment level of the validation study respondents				
n=19				
Status	Lower	Middle	Top	Total
	(Associate)	(Investmentmanager)	(Director, CEO)	
n	0	5	14	19
Proportion	0%	26%	74%	100%

Table 120 The employment level of the validation study respondents (own development)

In addition, the participating enterprises were able to contribute regarding the examination timeframe of 2010, 2011 and 2012. The subsequent table 121 shows that the participating enterprises were founded between 1969 and 2007, and hence were suitable for validation purposes.

The age structure of the validation sample					
n=19					
Type of investor	Independent	CVC	MBG	Public	Total
Responses	4	1	6	8	19
Median	2002	2007	1992	1999	1997
Max	2007	2007	1993	2005	2007
Min	1990	2007	1970	1969	1969
Range	17	0	23	36	38
Average age at survey moment	14.8	8.0	29.5	19.6	21.1

Table 121 The age structure of the validation sample (own development)

With regard to the respective financing phase of the participating investors, the subsequent table 122 shows that the majority of investors were concerned with expansion and start-up financing. Only one investor in the sample was concerned with seed financing purposes, which in

comparison to the main study survey was a clear underrepresentation (see table 63 in section 6.5.2).

The financing focus of the validation sample						
n=19 (multiple selection)						
Type of investor	Independent	CVC	MBG	Public	Responses	In %
Financing purpose						
Expansion	3	1	6	6	16	84%
Start-up	2	0	4	5	11	58%
MBO/MBI	1	0	3	5	9	47%
Seed	1	0	0	0	1	5%
Bridge/Replacement	0	0	0	1	1	5%
Turnaround	0	0	0	0	0	0%

Table 122 The financing focus of the validation sample (own development)

Unfortunately, the validation study did not reflect the main study in terms of financing focus and type of investor. In addition, this validation study might have suffered from post-hoc recall biases due to the time gap between the main study timeframe of 2010, 2011 and 2012, and the moment of the validation study in 2015 (see figure three in section 5.7). In order to keep the risk of post-hoc recall biases as small as possible, the validation study therefore concentrated on the most important research results.

6.7.3 The validation study results

This validation study was focused on the main study with regard to:

1. Dealflow:
   a) most important deal sources during 2010, 2011 and 2012;
   b) less important deal sources during 2010, 2011 and 2012.
2. Business plan screening:
   a) most important review fields in 2013;
   b) most important review fields during 2010, 2011 and 2012.
3. Due Diligence:
   a) most important review fields in 2013;
   b) most important review fields during 2010, 2011 and 2012.
4. Monitoring and mentoring:

a) areas of most frequent involvement in 2013;

b) monitoring and mentoring extent during the post-crisis phase.

5. Basel III: Impacts on the selection of industry branches.
6. AIFM-directive: Impacts on BP screening, the DD and the post-investment phase.

With regard to the acquisition of deals, the main study results had shown that banks and the network of the investors were the most important deal sources during the post-crisis phase (see table 78 in section 6.5.3). This result was confirmed by 11 out of 19 responses and not confirmed by six responses, which corresponded to the proportions of 58% and 32% respectively. The main study results, moreover, had shown that auctions, chambers of commerce and federations only played a minor or absolutely no role in the acquisition of deals. This result was confirmed by 14 out of 19 responses and hence 74%, whereas four participants and hence 21% disagreed.

With regard to the screening of business plans, the main study results had shown that the management team, the strategy, and the product and service were the most important review fields at the main study moment in 2013 (see table 79 in section 6.5.3). This result was confirmed by 14 out of 19 responses and hence a proportion of 74%, whereas four respondents and hence a proportion of 21% contradicted. In the context of business plan evaluations, the results had also shown that the management team, the strategy, and the product and service were the most important review fields during the post-crisis phase too (see table 80 in section 6.5.3). This main study result was confirmed by 15 out of 19 participating enterprises and not confirmed by three respondents, which corresponded to proportions of 79% and 16% respectively.

With regard to the due diligence, the main study results had shown that the management team, the strategy, and the product and service were the most important review fields at the moment of the survey in 2013 (see table 81 in section 6.5.3). This result was confirmed by 14 out of 19 responses and hence a proportion of 74%, whereas four respondents and hence 21% disagreed. The management team, followed from the strategy, and the product and service were the most important review fields during the post-crisis phase too (see table 82 in section 6.5.3). This main study result was confirmed by 15 out of 19 responses and hence a proportion of 79%, whereas three and hence 16% of the respondents contradicted. The subsequent table 123 summarises the validation study results regarding the pre-investment phase.

The validation study results part I								
Result	Confirmed		Not confirmed		No indication		Total	
Category	n	Share	n	Share	n	Share	n	Share
Deal acquisition								
1 a)	11	58%	6	32%	2	10%	19	100%
1 b)	14	74%	4	21%	1	5%	19	100%
BP screening								
2 a)	14	74%	4	21%	1	5%	19	100%
2 b)	15	79%	3	16%	1	5%	19	100%
DD								
3 a)	14	74%	4	21%	1	5%	19	100%
3 b)	15	79%	3	16%	1	5%	19	100%

Table 123 The validation study results part I (own development)

With regard to the phase of monitoring and mentoring, the main study results had shown that at the moment of the survey in 2013, investors were most often involved in board establishment, in finance and controlling, and in strategy development (see table 84 in section 6.5.3). This main study result was confirmed by ten out of 19 responses and hence a proportion of 53%, whereas eight respondents and hence 42% contradicted. The more detailed view showed that four of the eight participating public investors and the majority of the participating MBGs disagreed in that respect. These results were not comprehensible, as the MBGs in their separated calculation (see table 101 in appendix O) and the group of the public and the semi-public investors (see table 113 in appendix P) indicated that board establishment, finance and controlling, and strategy development were the most important mentoring areas at the moment of the survey in 2013. These different assessments should have been a result of the different rank orders in accordance with the different examination perspectives. In that respect, the main study results had shown that the MBGs and the group of the public and the semi-public investors were most often concerned with finance and controlling which took the first rank, rather than with board establishment or strategy development which took the second and the third rank respectively. Therefore, participants of the validation study might have thought that they should confirm the results in accordance with a specific rank order rather than confirming the most important areas regardless of their specific rank.

In the context of monitoring and mentoring, the results had also shown that approx. two-thirds of the survey respondents kept their degree of involvement unchanged during the post-crisis phase, whereas the remaining one third indicated and increasing involvement (see table 85 in section 6.5.3). Therefore, the validation study requested the confirmation that PE and VC investors had kept their degree of involvement stable during the post-crisis phase (see appendix Q.2). The main study results in that respect were confirmed by 12 out of 19 responses and hence a proportion of 63%, whereas six respondents and hence 32% disagreed (see subsequent table 124). These proportions in direct comparison with the main study results should be regarded as an overall confirmation that the majority of PE and VC investors had kept their involvement unchanged during the post-crisis phase.

The validation study results part II								
Result	Confirmed		Not confirmed		No indication		Total	
Category	n	Share	n	Share	n	Share	n	Share
Monitoring								
4 a)	10	53%	8	42%	1	5%	19	100%
4 b)	12	63%	6	32%	1	5%	19	100%

Table 124 The validation study results part II (own development)

With regard to Basel III, the main study results had shown that the implementation didn't influence the selection of industry branches by PE and VC investors (see table 87 in section 6.5.3). This result was confirmed by 18 out of 19 responses and hence a proportion of 95%, whereas one participant and hence 5% of the respondents disagreed. Finally, the validation study was concerned with the implementation of the AIFM-directive. In that respect, the main study results had shown that this implementation had no effect on business plan screening, on the due diligence or on monitoring and mentoring (see table 88 in section 6.5.3). This main study result was confirmed by 14 out of 19 responses and hence a proportion of 74%, whereas one respondent and hence a proportion of 5% contradicted. Interestingly enough, four participants and hence a proportion of 21% indicated that an assessment in that respect would not be possible (see subsequent table 125).

The validation study results part III								
Result	Confirmed		Not confirmed		No indication		Total	
Category	n	Share	n	Share	n	Share	n	Share
Basel III								
5.	18	95%	1	5%	0	0%	19	100%
AIFM-directive								
6.	14	74%	1	5%	4	21%	19	100%

Table 125 The validation study results part III (own development)

The validation study also asked for additional indications in an open category. Altogether, 15 additional indications were associated with the validation subjects (see subsequent table 126).

The results of the open category in the validation study	
Examination areas	Number of indications
Dealflow	4
Business plan	3
Due Diligence	3
Monitoring and mentoring	3
Basel III	1
AIFM-directive	1
Total indications	**15**

Table 126 The results of the open category in the validation study (own development)

The additional clarifications were indicated from four public investors, two independent investors and from one corporate venture capitalist. These additional indications specified the opinion of the respondent in the case of a different assessment. In that respect, two investors, which were focused on expansion financing, and MBO and MBI investments, indicated that auctions were also of importance in the acquisition of deals during the post-crisis phase. One investor mentioned that banks would not play any role in the acquisition of deals for venture capitalists. These additional indications regarding the deal flow should also explain the comparatively large proportion of disagreement regarding the relevance of deal channels during the post-crisis phase (see table 123 in section 6.7.3). The further indications did not contribute to the present study in any way. Therefore, their further presentation was omitted at that point.

The validation study results underlined the assumption that the main study results were consistent, at least regarding the screening of business plans, the due diligence and both Basel III and the AIFM-directive. The remaining inconsistencies might have been, inter alia, the result of the time gap between the examination timeframe and the moment of the validation study on the one hand and due to the different sample structures on the other hand. With regard to the sample structures, public and semi-public investors with a proportion of 74% in the validation study (see table 119 in section 6.7.2) were clearly overrepresented in comparison to their main study proportion of 50% (see table 59 in section 6.5.2). Moreover, PE and VC investors which were concerned with seed, bridge and replacement, or with turnaround financing were clearly under- or not all represented in the validation study (see table 122 in section 6.7.2 and table 63 in section 6.5.2). These reasons might have caused the divergent results regarding deal acquisition and monitoring. Nevertheless, it seemed reasonable to carry out an additional validation study to clear up the inconsistencies and to minimise the risk of a wrong result interpretation.

6.7.4 The validation study of the Mittelständische Beteiligungsgesellschaften

The initial validation study had shown that there remained some open questions in particular on the level of the Mittelständische Beteiligungsgesellschaften. Therefore, a separated validation study on the level of the MBGs was carried out during July and August 2017. In that regard, the MBGs of Schleswig-Holstein, Baden-Wurttemberg, Bavaria and Saxony were purposively selected for two reasons. First, these MBGs maintained separate divisions for venture capital financing beside their basic business and second, these MBGs were the biggest within their specific group. In order to receive a more detailed response, the responsible division managers of the venture capital divisions were considered in the sample frame too. In total, seven investment managers on the senior level were contacted by e-mail on 24 July 2017, and were invited to comment on the most important main study results for the MBGs. These MBGs received a study certificate and the results (see appendix Q.3) in German language. In order to arrange an appointment for a telephone interview, the selected MBGs were contacted during the first week of August 2017. Two investment managers denied to participate due to time constraints. Finally, five interviews were carried out until 9 August 2017. One investment manager was exclusively involved in venture capital activities and another investment manager was busy with both early-stage and later-stage investments. The remaining participants were exclusively busy with later-stage investments. The interviews took between ten and twenty minutes and were each manually

recorded. Even though this validation study was completely structured too, the participants were requested to detail their opinion during the telephone interview.

6.7.5 The results of the second validation study

This validation study was focused on the main study results with regard to:

1. Dealflow:
   a) most important deal sources during 2010, 2011 and 2012;
   b) less important deal sources during 2010, 2011 and 2012.
2. Business plan screening:
   a) most important review fields in 2013;
   b) changes on the level of the most important review fields.
3. Due Diligence:
   a) most important review fields in 2013;
   b) changes on the level of the most important review fields.
4. Monitoring and mentoring:
   - most important monitoring and mentoring areas in 2013.
5. Basel III: Impacts on the selection of industry branches.
6. AIFM-directive: Impacts on BP screening, the DD and the post-investment phase.

Due to the meanwhile larger time gap between the post-crisis phase and the moment of the second validation study, it was not expected to receive comprehensible responses regarding mentoring's extent between 2010 and 2012. Therefore, the point number 4 b) regarding the monitoring and mentoring extent during the post-crisis phase (see section 6.7.3) was left out in this validation study.

With regard to the acquisition of deals, the main study results had shown that banks, consultants and the network of the MBGs were the most important deal sources during the post-crisis phase. This result was confirmed by five out of five responses and hence a proportion of 100%. The main study results had also shown that auctions, chambers of commerce, federations and universities played a minor or absolutely no role in the acquisition of deals. This main study result of the MBGs was confirmed by 100% of the respondents too.

With regard to the screening of business plans, the main study results had shown that the management team, the market and the competition, the strategy, and the product or service were the most important review fields at the moment of the main study in 2013 (see table 97 in appendix O). This result was confirmed by five out of five responses and hence a proportion of 100%. The entire sample also confirmed that the importance of these most important review fields has not changed during the past years.

With regard to the due diligence, the main study results had shown that the management team, the strategy, and the product or service were the most important review fields at the moment of the main study in 2013 (see table 99 in appendix O). This result was confirmed by four out of five responses and hence a proportion of 80%, whereas one respondent and hence a proportion of 20% contradicted. Four respondents and thus 80% of the sample members also confirmed that the importance of the most important review fields has not changed during the past years either.

These results are summarised in the subsequent table 127.

The validation study results of the MBGs part I								
Result	Confirmed		Not confirmed		No indication		Total	
Category	n	Share	n	Share	n	Share	n	Share
Deal acquisition								
1 a)	5	100%	0	0%	0	0%	5	100%
1 b)	5	100%	0	0%	0	0%	5	100%
BP screening								
2 a)	5	100%	0	0%	0	0%	5	100%
2 b)	5	100%	0	0%	0	0%	5	100%
DD								
3 a)	4	80%	1	20%	0	0%	5	100%
3 b)	4	80%	1	20%	0	0%	5	100%

Table 127 The validation study results of the MBGs part I (own development)

With regard to the phase of monitoring and mentoring, the main study results had shown that the MBGs were most busy with finance and controlling, board establishment and strategy development at the moment of the survey in 2013 (see table 101 in appendix O). This result was

confirmed by four out of five responses and hence a proportion of 80%, whereas one respondent and hence a proportion of 20% contradicted.

The main study results had, moreover, shown that the implementation of Basel III has not influenced the selection of specific industry branches. Furthermore, the main study results had shown that the implementation of the AIFM-directive has not influenced the processes of business plan screening, the due diligence or the monitoring and mentoring of the portfolio companies. These both main study results were each confirmed by 100% of the responses.

This part of the results are summarised in the subsequent table 128.

The validation study results of the MBGs part II								
Result	Confirmed		Not confirmed		No indication		Total	
Category	n	Share	n	Share	n	Share	n	Share
Monitoring								
4)	4	80%	1	20%	0	0%	5	100%
Basel III								
5)	5	100%	0	0%	0	0%	5	100%
AIFM-directive								
6)	5	100%	0	0%	0	0%	5	100%

Table 128 The validation study results of the MBGs part II (own development)

The main study results had, moreover, shown that the MBGs were clearly focused on finance and controlling during the phase of monitoring and mentoring (see table 101 in appendix O and table 84 in section 6.5.3). The MBGs were therefore requested to substantiate their monitoring and mentoring behaviour regarding that specific aspect. Three of the participating MBGs pointed out that this kind of investor would not be focused on a specific industry sector. Instead, they would be industry sector open and would therefore not employ specialists. The majority of investment managers would have a finance or bank related educational background. Thus, the core competence would be the financial aspect rather than branch or market competences.

All other indications seemed very subjective and obviously also dependent on regional particularities. A further and detailed presentation was therefore omitted at that point.

Nevertheless, these additional indications showed that the VC and PE business seems to be very subjectively driven. In that regard, one investment manager for example argued that both the profit and loss statement, and the balance sheet would be most important during the monitoring and mentoring process, whereas another investment manager clearly contradicted. This respondent argued that he would be focused on market's future development rather than on past results and thus not really interested in the cashflow or the profit and loss statement. Furthermore, one investment manager argued that chambers of commerce would be relevant for the acquisition of deals, at least from time to time, whereas other investment managers argued that a cooperation would not be possible or that investment requests from this deal channel would always be poor. These subjective assessments might be one reason for the inconsistencies in the initial validation study. Moreover, this validation study showed that the inconsistencies in the initial validation study, at least along the results of the MBGs, were obviously also caused by the lack of detail in the questionnaire.

As a result of this validation study, it was surely possible to conclude that the main study results were finally consistent.

6.8 The conclusions

The aim of the present examination was to examine the developments of Germany's economic, innovation and public funding policy, and the development in Germany's PE and VC market during 2010, 2011 and 2012.

The objectives of the present examination were:

1. To examine Germany's economic and innovation policy during 2010, 2011 and 2012.

2. To examine the progress of public funding on the federal level for SME investments, innovation projects, enterprise founding and equity investments.

3. To examine the German PE and VC market on the level of early stage, public and semi-public investors, and on the level of their:
    a) investment strategy;
    b) investment behaviour;

c) investment process.

The aim and objectives were associated with a research question which was:

How did Germany's equity market and public funding policy develop during the post-crisis phase of 2010, 2011 and 2012?

The research question, the aim and objectives (see section 4.6.4) were basically associated with five presumptions (see section 4.6.3). These presumptions, rather than a set of detailed and testable hypotheses, were derived from the literature review (see section 4.6.1) and defined a skeletal theory with regard to the underlying examination areas. This skeletal theory was associated with broad understandings of relationships (Laughlin 1995) in the field of economic, innovation and public funding policy on the one hand and Germany's equity market on the other hand.

The first presumption supposed that in response to the financial crisis, the German government adjusted the economic, the innovation and hence the public funding policy in order to support SMEs, innovation, enterprise founding and the technology transfer. The second presumption supposed that the financial crisis caused an increasing risk awareness of PE and VC investors and that, therefore, investors changed their investment strategy and investment behaviour. The third presumption supposed that the indicators along the components of the investment process changed their respective weight during the post-crisis phase. The fourth presumption supposed that the implementation of the AIFM-directive affected PE and VC investors' processes of deal selection, deal screening and monitoring. The fifth presumption supposed that PE and VC investors preferred or avoided investments in specific industry branches due to the implementation of Basel III (see section 4.6.3).

These presumptions, as a skeletal theory in accordance with Laughlin's approach of so-called middle-range thinking, might or might not be enriched during the research process (see section 5.3). Even though the underlying examination was derived from a comprehensive and detailed research methodology (see chapter five), the research strategy of the present examination (see section 5.4 and figure one in section 5.4) was also regarded as skeletal in accordance with Laughlin's approach of middle-range thinking. This procedure ensured the possibility of the future adjustment of the research strategy in order to possibly expand the skeletal theory and,

moreover, to realise a comprehensive understanding of the earlier broad relationships (Laughlin 1995). This initial research perspective in context to Laughlin's approach of middle-range thinking (Laughlin 1995) is presented in the subsequent figure five.

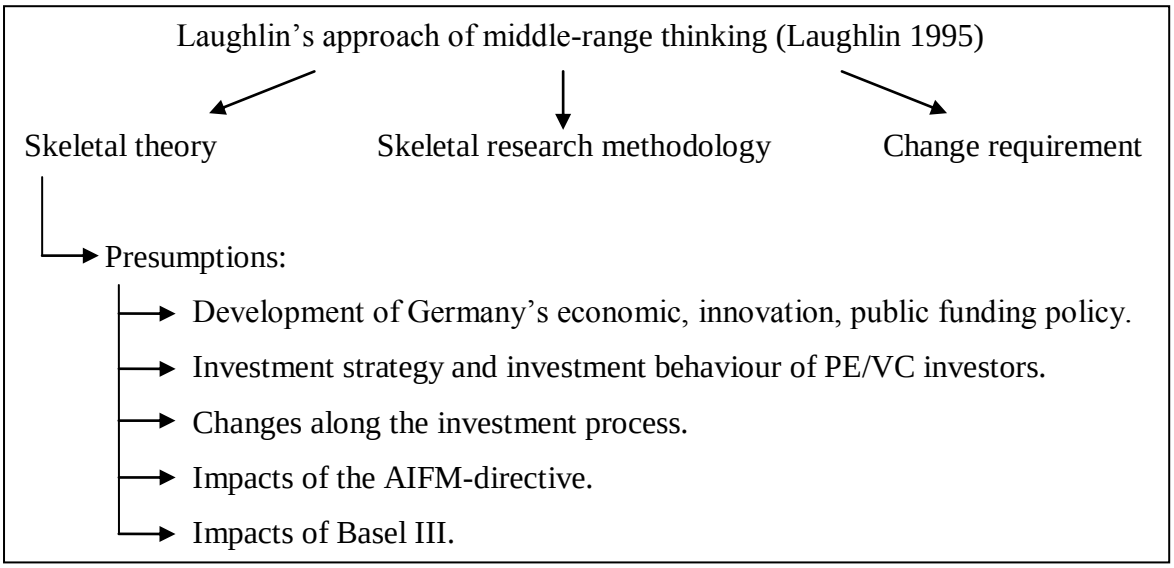


Figure 5 Middle-range thinking and the research perspective (own development)

With regard to the initial presumption, the results showed that the post-crisis phase was associated with a rather supply-driven economic policy and public household's consolidation. With regard to the innovation policy, the government followed a course of intervention-based policy to support research in specific areas of economical relevance and to align the structural change in desired directions (see sections 6.1.2, 6.1.3 and 6.1.4). With regard to Germany's public funding policy, the post-crisis phase was associated with a significant improvement and expansion. The government not only improved and expanded the research subsidies ZIM and KMU-innovativ (see table 42 in section 6.1.1, table 43 in section 6.1.2, table 44 in section 6.1.3 and table 45 in section 6.1.4) but, moreover, ensured the launch and the expansion of equity financing funds on the federal level (see tables 56 and 57 in section 6.4). Finally, the KfW improved and expanded the financing measures for SME investments and enterprise foundings (see sections 6.3.2, 6.3.3 and 6.3.4). This initial presumption was therefore regarded as supported.

With regard to the second presumption, the results showed that the financial crisis was neither associated with PE and VC investors' shift in larger investment classes (see tables 65 and 66 in section 6.5.2) nor with PE and VC investors' focus on larger enterprises (see tables 67 and 68 in

section 6.5.2). Even though the syndication proportion in the present sample was slightly increasing between 2010 and 2012 (see table 76 in section 6.5.3), this weak increase was not interpreted as an extraordinary development in the context of the financial crisis. With regard to the application of public funding, the results showed that the proportion of PE and VC firms which applied for public subsidisation between 2010 and 2012, in comparison to the initial crisis phase was comparatively large (see table 75 in section 6.5.3 and table 14 in section 4.3). This progress in context to long-term developments since the millennium turn was interpreted as a trend to normalisation rather than a result of crisis' impacts. Results, furthermore, showed that investors did not reduce their investment proportion in relation to the number of received business plans (see table 77 in section 6.5.3). The progress in both the number of investments (see table 71 in section 6.5.3) and portfolio companies (see table 70 in section 6.5.3) was not interpreted as a basic change of investors investment behaviour due to crisis' effects either. This applied both for an entire market perspective and more detailed for the support-oriented investors on the one hand and the more strategic and on profit-oriented investors on the other hand (see section 6.5.4 and appendix P). Finally, this applied also for the investment strategy and the investment behaviour of the so-called Mittelständische Beteiligungsgesellschaften (see sections 6.5.2, 6.5.3 and appendix O). The second presumption was therefore not supported from the research results.

The third presumption was only partly supported by the research findings. On the one hand, the results showed that the management team was held to be of increasing importance during the post-crisis phase. This applied both for the phases of the initial screening (see table 80 in section 6.5.3) and of the detailed screening (see table 82 in section 6.5.3). On the other hand, the post-crisis phase of 2010 to 2012 was neither associated with an increasing involvement of investors in the majority of cases (see table 85 in section 6.5.3) nor with a change in the relevance of monitoring areas (see table 84 in section 6.5.3). Finally, the results showed that the post-crisis phase was neither associated with an increasingly nor a comparatively large proportion of failed contract negotiations due to a particular contract right (see table 83 in section 6.5.3).

The fourth presumption was not supported by the research results. The results showed that the transformation of the AIFM-directive has no effect on the deal selection, the deal screening or the monitoring of the portfolio companies (see table 88 in section 6.5.3).

The final presumption was not supported by the research results either as the results showed that the implementation of Basel III neither prompted PE and VC investors to prefer nor to avoid investments in specific industry sectors (see table 87 in section 6.5.3).

The application of Laughlin's approach of middle-range thinking (Laughlin 1995) finally did not result in a substantial enrichment of the initial skeletal theory. Nevertheless, this flexible procedure supported the deeper analysis of the examination areas due to a more integrating rather than separating perspective. This more integrating perspective changed the initial research focus from the entire PE and VC market on the role of the public and the semi-public investors. This changed perspective underlined the differences between this type of investor with the remaining market members. In that context, the results also underlined the exceptional role of the so-called Mittelständische Beteiligungsgesellschaften, which did not only differ within their group of public and semi-public investors but also in comparison with the remaining market members (see section 7.2.5).

In addition, the further procedure in context to Germany's public funding policy underlined the central role of the KfW-Mittelstandsbank for the financing of SMEs and the support of Germany's PE and VC market (see sections 6.3.1, 6.3.2, 6.3.3, 6.3.4 and 6.4). Beside the initial research perspective and the initial presumptions, the results, moreover, showed that a major concern in the German PE and VC market during the post-crisis phase was associated with fundraising and exit options. Moreover, the market members were concerned due to the lack of an all-encompassing venture capital and private equity law (see sections 6.6, 6.6.1, 6.6.2 and 6.6.3).

The initial perspective on developments in Germany was finally expanded on interrelationships with European policy and strategy. Hence, by starting from a broader perspective, the examination finally resulted in a more integrative view which detailed the interaction between public decision makers, public bodies and private institutions to support the economy and innovation processes. The subsequent figure six presents the final examination subjects and their relationships as a result of Laughlin's approach of middle-range thinking (Laughlin 1995).

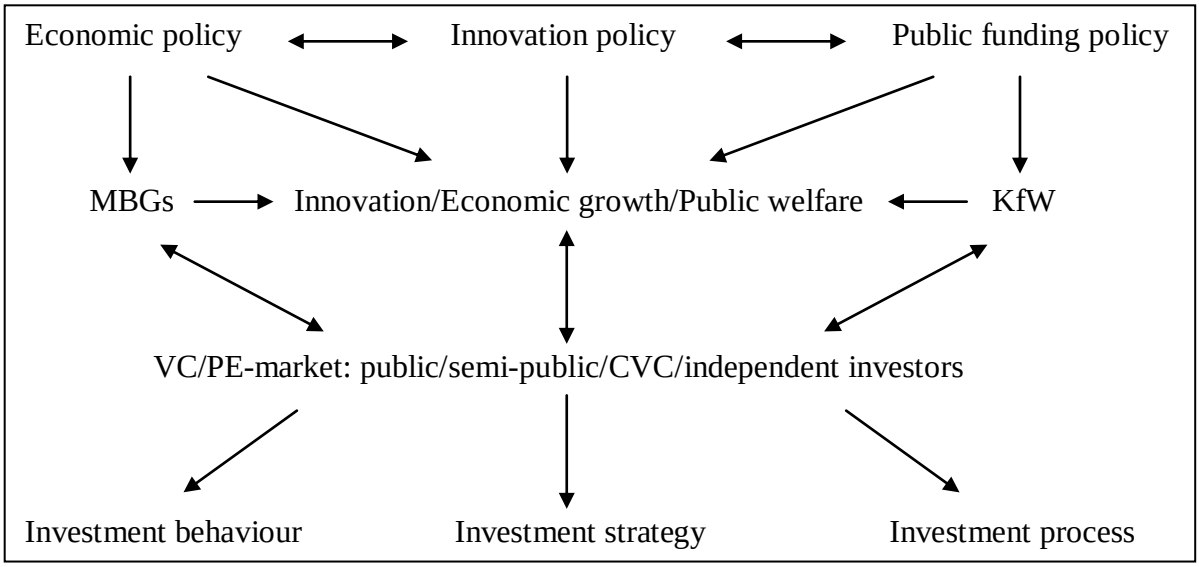


Figure 6 The final examination perspective and relationships (own development)

The subsequent discussion chapter is concerned with the detailed debate of these conclusions in context with Laughlin's approach of middle-range thinking (Laughlin 1995). The discussion takes a critical perspective in accordance with the Habermasion tradition (Laughlin 1995 and section 5.3) and is focused on the long-term innovation political aspects, the public and the semi-public investors, and finally on the critical evaluation of public funding initiatives in Germany.

Chapter 7 The discussion of the results

This chapter is initially concerned with the economic, the innovation and the public funding policy in Germany. Subsequently, this chapter details the developments regarding the German PE and VC market, the investment process and the public and semi-public investors. The chapter is finalised by implications for theory and practice, limitations and recommendations for further research.

7.1 The economic, the innovation and the public funding policy

7.1.1 The discussion regarding the economic and the innovation policy

With regard to the innovation policy in Germany, the literature showed that the millennium turn has introduced a phase of more integrated and surely more strategic innovation policy in comparison to the previous periods (see section 4.5.1). In that respect, the period between 1973 an 1982 was associated with a more intervention-based innovation policy in order to support the structural change (Welsch 2005) and to address the consequences of the oil crisis in 1973 and 1974 (Müller and Sturm 2010). The subsequent period until the year 2000 was associated with a more market-based innovation policy and the specification of new key technologies for future economic growth (Welsch 2005). This innovation political strategy was embedded in a more supply-driven economic policy until 1998 (Müller and Sturm 2010). The millennium turn was associated with economy's slow-down (Destatis 2013) and the subsequent crash of Germany's technological stock market segment, the so-called Neue Markt in 2002 (Ehren 2013). This development prompted the government to leave the path of more demand-driven economic policy which was briefly applied around the millennium turn as a consequence of the governmental change. Furthermore, the government was required to push significant social reforms through (Müller and Sturm 2010). In this context, the government was also prompted to realign the innovation policy in order to address an increasing globalisation and competition, the increasing importance of networks for technical progress and to intensify the technology transfer (Welsch 2005). The government finally launched the so-called HTS 2010 in 2006 in order to bundle the public research and education policy on the one hand and to align public research efforts on future demand areas on the other hand. These areas were climate and energy, health and nutrition, mobility and safety, and communication. These fields were regarded as support-worthy due to their future economic relevance (BMBF 2010). It is exactly this focus on long-

term demand areas, the attempt to increase innovation system's flexibility and its expansion (Welsch 2005) which supported the classification of the innovation policy as more integrative and strategic after the millennium turn.

With regard to the economic policy, the initial crisis phase was surely associated with typical Keynesian incentives and hence with a more demand-driven economic policy to relieve the entire economy, the private households and to stabilise the financial sector (see consecutive no. one, two, three, nine and 17, in table 42 in section 6.1.1). Nevertheless, the research results, moreover, showed that the government left the path of strong public involvement already in 2010, inter alia, by appointing an expert panel regarding exit strategies from public investments (see consecutive no. three, in table 43 in section 6.1.2).

With regard to the innovation policy during the post-crisis phase, the government relaunched the HTS from 2006 already in 2010 (see consecutive no. 68, in table 43 in section 6.1.2), improved the federal research funding significantly (see consecutive no. 79, in table 42 in section 6.1.1; consecutive no. 72 and 73, in table 43 in section 6.1.2; consecutive no. 78 and 79, in table 44 in section 6.1.3 and consecutive no. 83 and 84, in table 45 in section 6.1.4) and, furthermore, improved the public funding for equity, start-up and SME financing (see consecutive no. 44 and 45, in table 42 in section 6.1.1; see consecutive no. 76, in table 44 in section 6.1.3 and consecutive no. 86, 87 and 90, in table 45 in section 6.1.4 and with regard to SME financing see also section 4.5.2). This development both in the initial and during the post-crisis phase supported innovation policy's classification as intervention-based.

7.1.2 The discussion regarding innovation related developments

The literature review in section 2.6.2 initially showed that the innovation related developments in Germany were associated with several particularities. At first, research data showed that the proportion of research active enterprises and the proportion of both product and process innovators were not only increasing in relation to the enterprise size but were also bigger in the industry than in the service sector (see table six in section 2.6.2). In addition, research data showed that the profit contribution of both product and process innovations increased in relation to the enterprise size too and that their profit contribution was bigger in the industry than in the service sector (see table seven in section 2.6.2). Moreover, research data showed that the major

stake of new products revenues came from product imitations rather than real product inventions (Rammer et al. 2014).

In 2012, approx. 64% of the total research expenses were realised in the chemistry, the pharmaceutical, the electronics, the automotive and the mechanical engineering sector. These industry branches increased their research expenses between 2008 and 2012. In terms of an enterprise-size related perspective, approx. 76% of these research expenses were realised in enterprises with more than 500 employees (see section 2.6.2 and Rammer et al. 2014). As a result, Germany's innovation capacity seemed one-sided and limited to specific branches and enterprises-sizes.

Even though the government expanded the public support for innovation purposes significantly (see consecutive no. 79, in table 42 in section 6.1.1; consecutive no. 72 and 73, in table 43 in section 6.1.2; consecutive no. 78 and 79, in table 44 in section 6.1.3; consecutive no. 83 and 84, in table 45 in section 6.1.4), the further progress was not associated with positive developments. On the one hand, the data show that the expenses for innovation purposes increased from approx. 128 billion euros in 2008 to approx. 145 billion euros in 2014. This was an increase of approx. 13.2%. On the other hand, the innovation expenses of the SMEs decreased from approx. 27 billion euros in 2008 to approx. 22 billion euros in 2014, while these expenses on the level of the bigger-sized enterprises increased from 101 billion euros in 2008 to 123 billion euros in 2014, and hence by 21.8% (see subsequent table 129).

The innovation expenses in the industry and service sector in BEUR						
Year						
Number of	2008		2012		2014	
employees	Expenses	Proportion	Expenses	Proportion	Expenses	Proportion
5 – 249	27.08	21%	24.19	18%	21.56	15%
249 <	101.00	79%	113.23	82%	123.47	85%
Total	**128.08**	**100%**	**137.42**	**100%**	**145.03**	**100%**

Table 129 The innovation expenses in the industry and service sector in BEUR; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2010, p. 17; Rammer et al. 2014, p. 16; Rammer et al. 2016, p. 15)

The innovation statistics also show that the proportion of enterprises which were classified as innovation active was decreasing decrementally between 2008 and 2014. This applies both for the industry and the service sector, and for every enterprise-size class. In that context, the data also show a significant decline in the proportion of both product and process innovators between 2008 and 2014 (see subsequent table 130). Moreover, the data show that the revenue proportions of product innovations were declining from 16.6% in 2008 to 12.6% in 2012, but subsequently improved albeit slightly to 12.8% in 2014 (see table 131). This progress of the innovation activities, of the proportion of product and process innovators (see subsequent table 130), and of the innovation success (see table 131) surely contradicts a desired state and might explain government's strong focus on technology transfer's acceleration (see section 6.2.1).

The innovation statistics for the industry and service sector									
Number of	Innovation activities			Product innovators			Process innovators		
employees	Year								
	2008	2012	2014	2008	2012	2014	2008	2012	2014
Industry									
5 – 49	63%	53%	48%	38%	34%	30%	31%	22%	21%
50 – 249	79%	72%	68%	57%	50%	47%	49%	39%	34%
250 – 999	90%	83%	84%	71%	68%	67%	67%	57%	58%
1,000 <	97%	95%	95%	89%	87%	86%	87%	83%	83%
Services									
5 – 49	48%	46%	40%	28%	25%	25%	26%	18%	16%
50 – 249	54%	47%	50%	35%	27%	28%	41%	27%	30%
250 – 999	72%	62%	65%	48%	35%	36%	50%	44%	42%
1,000 <	87%	79%	76%	72%	61%	61%	75%	68%	63%
Total	**56%**	**51%**	**46%**	**34%**	**30%**	**29%**	**31%**	**22%**	**20%**

Table 130 The innovation statistics for the industry and service sector; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2010, p. 15; Rammer et al. 2014, p. 14; Rammer et al. 2016, p. 13)

The innovation success of the industry and service sector									
Number of employees	Product innovations Revenue proportions			Process innovations Proportion on cost reductions			Process innovations Revenue proportion of quality improvements		
Year									
	2008	2012	2014	2008	2012	2014	2008	2012	2014
Industry									
5 – 49	10.2%	7.5%	8.0%	1.9%	1.1%	1.0%	2.2%	1.1%	0.9%
50 – 249	13.7%	9.2%	8.1%	2.7%	1.8%	1.5%	2.0%	1.4%	1.1%
250 – 999	13.5%	10.7%	9.9%	3.8%	2.8%	3.1%	2.2%	1.4%	1.3%
1,000 <	33.4%	27.4%	26.5%	5.2%	4.8%	4.2%	3.8%	2.4%	1.8%
Services									
5 – 49	6.4%	6.0%	5.1%	1.9%	1.9%	0.3%	2.1%	0.9%	0.6%
50 – 249	9.8%	4.7%	3.1%	1.5%	1.1%	1.2%	2.3%	0.8%	0.8%
250 – 999	6.9%	3.8%	6.0%	4.0%	3.2%	2.7%	1.2%	0.7%	1.0%
1,000 <	14.9%	9.6%	12.4%	5.6%	4.4%	3.7%	2.7%	2.6%	2.4%
Total	**16.6%**	**12.6%**	**12.8%**	**3.9%**	**3.3%**	**2.8%**	**2.6%**	**1.7%**	**1.4%**

Table 131 The innovation success of the industry and service sector; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2010, p. 18; Rammer et al. 2014, p. 17; Rammer et al. 2016, p. 16)

These developments basically raise the question of whether the public funding policy was effective. The attempt to boost the innovation activity at least on the level of these enterprises which are regarded as support-worthy, namely the SMEs, obviously did not cause the desired state. This issue of public funding's effectiveness is discussed in greater detail in section 7.3.3. In addition, it was not possible to stop the declining innovation activity either (see table 130). This development, moreover, raises the question of whether the declining trend was caused by financial crisis related impacts or associated with more long-term related effects.

In that respect, research data support the conclusion that the innovation related developments in Germany seem to be a long-term rather than a financial crisis related and thus short-term phenomenon. The research data show that out of an industry sector related perspective, only the so-called research-intensive industry with the chemistry, the pharmaceutical, the electronics, the mechanical engineering and the automotive sector were able to keep the proportion of both product and process innovators at least stable between 2000 and 2008. On the other hand, the subsequent period until 2014, show a declining trend on the level of the research-intensive industry too even though their research expenses were increasing during this period. These

proportions in the remaining industry sectors, e. g. mining, energy or recycling, and in the service sector were decreasing during the same period of 2000 until 2014. This decline already started in 1998, after an initial increase on the level of the entire industry and the service sectors, approx. from the middle of the nineties on (Rammer et al. 2016). This development should also be considered in context to these enterprises which carried out research and development continuously. This proportion of continuously research active enterprises in Germany was only increasing on the level of the research-intensive industry between 1993 and 2014, while the remaining industry sectors and the service sector kept this proportion at least stable (Rammer et al. 2016). With regard to the research and development expenses, research data show that the expenses on the level of the research-intensive industry were increasing from approx. 42 billion euros in 2000 to approx. 75 billion euros in 2008. These research expenses were not only comparatively smaller both in the remaining industry sectors and the service sector but developed rather unchanged on that level between 2000 and 2008. The further development until 2014, show an increase up to approx. 93.4 billion euros on the level of the research-intensive industry but only a slight increase on the level of the remaining industry and the service sectors. The earlier development between the middle of the nineties and the millennium turn was associated with an increase on the level of the research-intensive industry too and only a very slight increase on the level of the remaining industry and the service sectors (Rammer et al. 2016).

With regard to an enterprise-size related perspective, the data show that the research expenses on the level of the bigger-sized enterprises were increasing, whereas these amounts developed unchanged on the level of the SMEs between 2000 and 2008. The period between the middle of the nineties and the millennium turn was associated with an increase on the level of the bigger-sized enterprises and a comparatively stable development on the level of the SMEs (Rammer et al. 2014). The entire development of the research expenses between 1995 until 2014, for both the smaller and the bigger-sized enterprises, is summarised in the subsequent table 132.

The progress of the innovation expenses in BEUR			
Year			
Number of	1995	2012	2014[1)]
employees			
500 <	35.1	104.8	115.1
499 >	25.7	32.6	31.7
Total	**60.8**	**137.4**	**146.8**

1) Estimation.

Table 132 The progress of the innovation expenses in BEUR; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2014, p. 13)

This progress on the level of the bigger-sized enterprises stands for an increase of approx. 328% in comparison to an increase of 23.5% on the level of the smaller enterprises between 1995 and 2014 (see table 132).

As a result of these long-term developments, the declining profit contributions of product and process innovations, which were already shown for the timeframe between 2008 and 2014 (see table 131), were not a short-term phenomenon either. In that respect and out of an industry sector related perspective, the revenue proportions of product innovations were declining on the level of the industry and the service sector between 2000 and 2014. These developments are summarised in the subsequent table 133.

The revenue proportions of the product innovations[1)]		
Year		
Type of industry/service sector	2000	2014
Research-intensive industry	42%	33%
Remaining industry sectors	16%	7%
Knowledge-intensive services	15%	10%
Remaining services	9%	6%

1) Including product inventions, product improvements, product imitations.

Table 133 The revenue proportions of the product innovations; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2016, p. 8)

More detailed data show that this decline of the revenue proportions also applies for these products which are separately classified as completely new or significantly improved. This more

detailed result applies for every industry and service sector, and at least for the period between 2000 and 2008. The subsequent period until 2014, was associated with quite stable and so far improved developments (Rammer et al. 2016).

Finally, data show that the contribution of process innovations on cost reductions declined out of an industry sector related perspective between 2000 and 2014 too. This development is summarised in the subsequent table 134.

The contribution of the process innovations on cost reductions		
Year		
Type of industry/service sector	2000	2014
Research-intensive industry	7.7%	3.9%
Remaining industry sectors	5.3%	2.8%
Knowledge-intensive services	4.0%	3.3%
Remaining services	2.0%	1.3%

Table 134 The contribution of the process innovations on cost reductions; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2016, p. 9)

Therefore, innovation related developments in Germany are surely not a short-term phenomenon which should be regarded in the context of the financial crisis alone. The long-term perspective rather showed that even the research-intensive industry sectors, despite their increasing amount of research expenses seemed not to be able to stop the declining trend either. Hence, financing capital alone seemed obviously not the only, if at all, the core problem field. Furthermore, next to the fact that it was obviously not possible to improve the research contribution of the smaller enterprises, seems to be that Germany's economy depends on specific sectors. In that regard, automotive, electronics and mechanical engineering were the most successful industry sectors in terms of revenue proportions of product innovations in 2014 (Rammer et al. 2016). With some minor changes, this was already the case approx. one decade ago (Rammer et al. 2005). The subsequent table 135 summarises the most important industry sectors with regard to their proportion on product and process innovators, continuously research active enterprises and revenue proportions of product innovations.

The industry sectors' importance		
	Continuously research active industry branches	
Rank/Year	2003	2014
1.	Chemistry/Pharmacy	Chemistry/Pharmacy
2.	Electronics	Electronics
3.	Mechanical engineering	Mechanical engineering
4.	Automotive	IT/Telco
	Product and process innovators	
Rank/Year	2003	2014
1.	Chemistry/Pharmacy	Chemistry/Pharmacy
2.	Mechanical engineering	Mechanical engineering
3.	Electronics	Electronics
4.	IT/Telco	IT/Telco
	Revenue proportions of product innovations[1)]	
Rank/Year	2003	2014
1.	Automotive	Automotive
2.	Electronics	Electronics
3.	IT/Telco	Mechanical engineering
4.	Furniture/Sports/Recycling	Textile/Leather

1) Including product inventions, product improvements, product imitations.

Table 135 The industry sectors' importance; extrapolations for the population of enterprises in Germany with more than five employees (derived from Rammer et al. 2005, p. 9; Rammer et al. 2016, pp. 3, 8, 9)

Surely worth mentioning in that context is the dominance of the automotive sector which is expressed by a comparatively larger profit contribution of product innovations on the one hand and the obviously minor success of the information and telecommunication sector in 2014. Nevertheless and as already indicated, the profit contributions of product innovations were dominated from product imitations rather than product inventions. This applies for every industry and service sector (Rammer et al. 2005; Rammer et al. 2016) and underlines the conclusion of Welsch (2005) who already argued that Germany would be concerned with the improvement of products rather than the development of radical innovations. Thus, Germany would not be able to develop new markets and new industry sectors under the given circumstances (Welsch 2005). Therefore, it seems questionable if the bulk of public funding finally results in positive outcomes and thus an increasing innovation activity and success. What in this context underlines the doubtfulness of the public funding's increase, is the development of Germany's number of so-called world-market relevant patents. These patents, which are either registered in Europe or at the World Intellectual Property Organization, are important for an

export-oriented economy as in the case of Germany (BMBF 2016). In that regard, it was obviously not possible to increase the output on world-market relevant patents substantially. The subsequent table 136 shows that this number of patents increased only slightly in Germany between 2003 and 2013, while other countries both in Europe and in particular in Asia were surely more successful.

The development of the world-market relevant patents[1)]					
Year	2000	2003	2009	2013	Progress
Country	Annual number of patents				2003 – 2013
South Korea	61	120	226	308	156.7%
Japan	214	247	293	375	51.8%
Sweden	407	323	398	435	34.7%
Finland	383	327	372	423	29.4%
Switzerland	520	533	584	604	13.3%
Germany	332	341	376	372	9.1%

1) Per million inhabitants.

Table 136 The development of the world-market relevant patents;
(derived from table 1.8.4 on www.datenportal.bmbf.de, accessed July 2017)

Despite the fact that the innovation statistics do not consider every enterprise size and industry branch, and might also suffer from biases due to a flexible interpretation of the innovation term (see section 2.6.2), they surely provided a basic orientation on innovation related developments in Germany. In the context with these long-term developments, the subsequent section details the public funding aspects in Germany.

7.1.3 The discussion regarding the public funding related developments

With regard to the public funding of PE and VC investments, and the additional measures which were launched both during the post-crisis and the subsequent phase (see tables 56 and 57 in section 6.4), an assessment may be too early. Nevertheless, an initial look on Germany's PE and VC market shows that the absolute investment amounts were decreasing between 2007 and 2015, while the relative proportion of VC investments on total investments was considerably increasing from 8% in 2007 to 13% in 2015. On the other hand, the proportion of total PE and VC investments in relation to Germany's GDP was decreasing between 2007 and 2015, as did the proportion of VC investments during the same period (see subsequent table 137).

The indications for the German PE and VC market					
Year	2007	2009	2011	2013	2015
	in MEUR				
Total investments	10,448	3,024	6,667	5,055	6,599
VC investments	817	659	717	716	837
Proportion of VC	8%	22%	11%	14%	13%
PE/VC as of GDP	0.42%	0.12%	0.25%	0.18%	0.22%
VC as of GDP	0.032%	0.027%	0.027%	0.025%	0.028%

Table 137 The indications for the German PE and VC market;
based on market statistics (derived from InvestEurope 2016)

Interestingly enough, the decline of venture capital investments in any of the periods in table 138 was not as strong as in the case of the remaining types of equity investments. In that respect, the calculations show that the total amount of PE investments in Germany was declining by approx. 40.2% between 2007 and 2015, while the venture capital investments were increasing, albeit slightly, by approx. 2.5% during the same period (see subsequent table 138).

The percentage developments in Germany's PE and VC market			
Period	2007 – 2009	2007 – 2011	2007 – 2015
Total investments[1)]	-71.1%	-36.2%	-36.8%
Total investments without VC	-75.5%	-38.2%	-40.2%
VC investments	-19.3%	-12.1%	2.5%

1) Market statistics (including the investments of investors from outside Germany).

Table 138 The percentage developments in Germany's PE and VC market
(derived from InvestEurope 2016)

In the context of the public funding initiatives on the federal level, the research results showed that within the selected funding areas of the so-called KfW-Mittelstandsbank, the credit programmes for enterprise founding and SME financing were the dominating types of funding. Their proportion on the entire programme volume varied between 78% and 91% during 2008 and 2012 (see table 53 in section 6.3.4). Within this programme line of enterprise founding and SME financing, the so-called Unternehmerkredit was the most important type of credit. Nevertheless, the proportion of the so-called Unternehmerkredit on credits for enterprise

founding and SME investments was decreasing from approx. 88.2% in 2008 to approx. 71.9% in 2012, due to the significant increase of credits for enterprise founding. This proportion was increasing from 2.9% in 2008 to approx. 22.8% in 2012 (see table 53 in section 6.3.4). The proportion of equity financing on the entire programme volume was comparatively small and, moreover, was decreasing from 2.3% in 2008 to 1.4% in 2012 (see table 53 in section 6.3.4). On the other hand, the analysis showed that the funding proportion of the KfW on the entire PE and VC market was on average 4% between 2008 and 2012. On the level of the venture capital investments this proportion of the KfW was on average 29% during the same period (see table 54 in section 6.3.4). KfW's importance in that respect is also underlined by KfW's proportion on the number of venture capital investments. Even though KfW's number of equity investments declined, KfW's proportion on the entire VC investments in Germany was on average 61% for the period of 2008 until 2012 (see subsequent table 139). This proportion should be larger in the case that the statistic would consider the indirect involvement of the KfW in Germany's venture capital market (see table 55 in section 6.3.4).

KfW's proportion on PE and VC investments in Germany					
Year	2008	2009	2010	2011	2012
Total number of KfW's equity investments[1)]	614	560	614	541	464
Total number of VC investments in Germany	1,044	929	966	884	768
Total number of PE/VC investments in Germany	1,342	1,216	1,359	1,291	1,272
KfW's proportion on VC investments	58.8%	60.3%	63.6%	61.2%	60.4%
KfW's proportion on total PE/VC investments	45.8%	46.1%	45.2%	41.9%	36.5%

1) KfW data (see table 52 in section 6.3.1).

Table 139 KfW's proportion on PE and VC investments in Germany;
based on EVCA market statistics (derived from EVCA 2013)

This development surely underlines the relevance of the KfW as a funding provider in general and in the PE and VC market in particular. The relevance of the KfW during earlier periods was already mentioned by Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). Interestingly enough, the expansion of ERP-Startfund's fund volume both during the initial and the post-crisis phase (see table 57 in section 6.4) did not result in an increasing investment activity (see table 54 in section 6.3.4). This development in the context of the undiminished large number of investment requests (see table 77 in section 6.5.3) might be a sign

for a strictly qualitative orientation of the KfW regarding equity investments. This assumption is also underlined by the interview results which made it clear that it was more difficult to receive public co- or refinancing measures for equity investments (see section 6.5.5).

In this context of public funding initiatives for equity financing, the subsequent sections are now concerned with the progress of Germany's PE and VC market.

7.2 The discussion regarding the equity market in Germany

The subsequent clarifications initially present the research results out of an entire sample perspective. In a second step, the results are presented with regard to the group of public and semi-public investors on the one hand and the profit-oriented and strategic investors on the other hand. Finally, the results regarding the Mittelständische Beteiligungsgesellschaften are presented separately and in comparison to the sample groups of the public and the semi-public investors on the one hand and the profit-oriented and strategic investors on the other hand. This presentation considers earlier research results for comparison purposes.

7.2.1 The discussion regarding the equity market's development

With regard to the developments out of an entire sample perspective and thus developments on the level of the early-stage investors, of the public investors and of the semi-public investors, the results initially showed that the mechanics and industry automation, the software and IT, the electronics, the life science, the telecommunication and the internet sector were still the dominating industry branches (see table 69 in section 6.5.2). According to long-term developments since the millennium turn (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010), investors obviously did not change their investment strategy in that respect. Furthermore, the present examination showed that the preferred types of equity investments were minority and silent investments at the moment of the survey in 2013 (see table 64 in section 6.5.2). The focus on minority investments in the present examination agrees with the research results of Achleitner et al. (2010) for the initial phase of the financial crisis. In both cases, the overwhelming majority of corporate venture capitalists, of Mittelständische Beteiligungsgesellschaften and of public investors was each focused on minority rather than on majority investments. Independent investors on the other hand also realised majority investments in a comparatively larger proportion of cases (see table 64 in section 6.5.2).

The results also showed that both the fund volumes (see table 72 in section 6.5.3) and the investment volumes (see table 73 in section 6.5.3) were increasing during the post-crisis phase of 2010, 2011 and 2012. On the other hand, the number of portfolio companies (see table 70 in section 6.5.3) and the number of investments (see table 71 in section 6.5.3) were both decreasing between 2010 and 2012. This investment behaviour resulted in increasing investment volumes per deal from approx. 976 TEUR in 2010 to 1.2 MEUR in 2012 (see table 74 in section 6.5.3). In that context, the major proportion of investments were realised in a range up to 1.5 MEUR per deal, with a concentration of the investors on deal sizes between 500 TEUR and 1.5 MEUR per deal (see table 65 in section 6.5.2). This corresponds with earlier research results for the period of 1999 until 2009, regarding the dominance of specific investment classes (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). Hence, investors did not change their investment strategy in that respect either.

The results, furthermore, showed that the investment proportion in the German PE and VC market did not considerably change and remained stable by approx. 6% during 2010, 2011 and 2012 (see table 77 in section 6.5.3). This means that according to a total market perspective, the investment proportion in relation to the number of received business plans had not fundamentally changed since the millennium turn either (see table 17 in appendix D). The results also showed that the majority of investors syndicated their investments. The syndication proportion for the entire sample was on average 59% per year during the post-crisis phase (see table 76 in section 6.5.3). This result corresponds with earlier research results which already showed that the majority of equity investments in Germany were syndicated (Achleitner et al. 2006; Achleitner et al. 2010). This syndication proportion differs only slightly from earlier syndication proportions both in 2005 and in 2010 (see table 15 in section 4.3). In addition, 50% of the survey participants considered public funding measures for their equity investments (see table 75 in section 6.5.3). This result underlines the importance of public funding in Germany's equity market which was already shown by the research results of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). Hence, investors neither changed their investment behaviour with regard to the investment proportion, the syndication of investments nor with regard to the consideration of public funding measures.

7.2.2 The discussion regarding the pre-investment phase

In the context of the acquisition of deals, the results of the present thesis showed that banks and networks were the most important deal sources during the post-crisis phase (see table 78 in section 6.5.3). This continues earlier assessments regarding the importance of banks and networks for the acquisition of deals (Achleitner et al. 2006; Achleitner et al. 2010). On the other hand, it was initially expected that chambers of commerce and federations would be important for the acquisition of deals too. This was not the case and the results in that respect showed that during 2010, 2011 and 2012, chambers of commerce and federations were each classified on the lowest ranks. On the other hand, results also showed that investors still avoided the acquisition of deals from consultants, over auctions or PE and VC firms (see table 78 in section 6.5.3), obviously as a consequence of cost disadvantages.

With regard to the screening of business plans, the results showed that the management team was still held to be the most important review field in 2013 (see table 79 in section 6.5.3). Even though a remarkable proportion of investors indicated a stronger emphasis on the management team and a minor proportion of the respondents also on additional review fields, the initial phase of the crisis did not cause a fundamental change in each review fields earlier relevance (see section 4.4.2 and table 80 in section 6.5.3). A rather equal assessment applies for the results on the level of the due diligence (see section 4.4.3 and tables 81 and 82 in section 6.5.3). Thus, these results confirm the unchanged importance of the management team during the entire decision making process (see sections 4.4.2. and 4.4.3).

With regard to the proportion of break-off reasons, the studies of Achleitner et al. (2006 and 2010) showed that the proportion of deals which were broken off due to a particular contract right were increasing between 2004 (Achleitner et al. 2006), and the initial phase of the crisis (Achleitner et al. 2010). Achleitner et al. (2010) in that respect point out that decision making rights, investors' liquidation rights and in particular the enterprise value were the most important reasons for breaking off negotiations in 2009. These were surely comprehensible results as the PE and VC firms obviously tried to compensate the larger investment risk with more investment flexibility and price deductions. The present study in that respect showed that the proportion of deals which were broken off due to contract clauses improved during the post-crisis phase (see table 83 in section 6.5.3), obviously as a consequence of the comparatively stable economic development (Destatis 2013). Nevertheless, the most important reason for breaking of

negotiations during the post-crisis phase was that no investor realised the deal (see table 83 in section 6.5.3). This might have had its reason in the possibility that enterprises finally decided for alternative types of financing, for credit financing due to cost advantages or that the investment reason finally fell away, as already mentioned by Achleitner et al. (2006) and Achleitner et al. (2010).

7.2.3 The discussion regarding the post-investment phase

With regard to the post-investment phase, the results showed that the investors were most often involved in board establishment, finance and controlling, and strategy development at the moment of the survey in 2013 (see table 84 in section 6.5.3). These results correspond with earlier research results regarding the overwhelming importance of the board for the interaction between the investors and their portfolio companies and, furthermore, regarding the importance of finance and controlling and portfolio company's strategy (see section 4.4.6).

In terms of investor's involvement, the results showed that the majority of respondents kept their degree of involvement stable, whereas anyhow one third of the respondents indicated an increasing involvement during the post-crisis phase (see table 85 in section 6.5.3). Hummel (2011b) in that context argues that the monitoring and mentoring extent, which is expressed in hours and personal contacts in his research examination, was increasing in the German PE and VC market between 2007 and 2009. This supports the assumption that in comparison to these results, the German PE and VC market followed a trend of normalisation rather than a further increasing hands-on activity during the post-crisis phase.

With regard to investor's exit, the results showed that the preferred type of exit route, namely initial public offerings, were very difficult to realise during the post-crisis phase (see table 86 in section 6.5.3). Therefore, investors alternatively tended to trade sales rather than secondary purchases which would have been associated with smaller investment returns (see section 4.4.7). This conclusion agrees with earlier research results for the initial crisis phase and with regard to the importance of trade sales and a minor relevance of both IPOs and secondary purchases (Achleitner et al. 2010). The research results of the present study, moreover, agree with long-term developments which showed both a smaller proportion of IPOs and of secondary purchases in comparison to the predominating proportions of trade sales and of total losses (Hummel

2011b). The subsequent table 140 summarises the results regarding the entire sample perspective.

The summary of the main study results	
Examination area	Examination result for the post-crisis phase
Investment proportion[1)]:	6% on average per year.
Syndication proportion[2)]:	59% on average per year.
Public funding proportion:	50% of the respondents at least sometimes.
Average investment volumes per deal:	0.976 MEUR to 1.203 MEUR.
Preferred type of investments:	Minority and silent investments.
Dominating industry branches:	Mechanics/industry automation, software/IT, electronics, life science, telco, internet.
Deal sources: a) most important: b) least important:	 Banks and networks. Chambers of commerce and federations.
Review areas (initial and detailed screening): a) most important: b) least important:	 Management team. Organisation.
Break-off reasons: a) most important: b) least important:	 No investor realised the deal. Particular contract right.
Mentoring areas: a) most important: b) least important:	 Board establishment, finance & controlling, strategy development. Procurement & production.
Investor's involvement:	Two thirds of the respondents kept their involvement unchanged; One third of the respondents increased their involvement during the post-crisis phase.
Most important exit channels:	Buy backs/repayment of silent investments, trade sales.
Effects of the Basel III implementation:	No effects on the consideration of industry branches.
Effects of the AIFM implementation:	No effects on the selection, the screening and the monitoring process.

1) From the number of received business plans.

2) From the total number of investments.

Table 140 The summary of the main study results (own development)

These research outcomes for the entire sample show that the market participants neither changed their basic investment strategy nor their investment behaviour in comparison to the earlier developments since the millennium turn. Moreover, the research outcomes show that the financial crisis did not cause changes along the investment process.

The subsequent section steps into a more detailed interpretation of the examination results and therefore distinguishes between the public and the semi-public investors on the one hand and the group of more strategic and profit-oriented investors on the other hand.

7.2.4 The discussion regarding the public and the semi-public investors

The survey results also showed that the group of public and semi-public investors and the group of more strategic and on profit-oriented investors, were focused on minority rather than on majority investments at the moment of the survey in 2013. Moreover, the results support the assumption that the public and the semi-public investors were clearly focused on silent investments (see table 102 in appendix P). These results agree both with the research findings of Schilder (2006), who was earlier research active regarding public venture capital in Germany, and the results of Achleitner et al. (2006). In addition, the results showed that the majority of the public and of the semi-public investors were focused on investments up to 1.5 MEUR per deal, whereas the remaining sample group also realised deals in larger investment classes (see table 103 in appendix P). This agrees with earlier research studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). According to their research results, on average approx. 90% of the investments from the public and the semi-public investors were associated with deal sizes up to 1.5 MEUR per deal in comparison to an average proportion of approx. 45% on the level of the independent investors and the CVCs (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010).

With regard to the consideration of industry branches, the results showed that the group of the public and the semi-public investors either considered every kind of industry branch or tended to be focused on specific industry branches. On the other hand, the results also showed that the group of more strategic and profit-oriented investors tended to be specialised on specific industry branches (see table 104 in appendix P).

Furthermore, the results showed that both the fund and the investment volumes of the public and the semi-public investors were smaller (see tables 107 and 108 in appendix P), whereas both their number of portfolio companies and investments were larger (see tables 105 and 106 in appendix P). As a result, the deal sizes on the level of the public and the semi-public investors were smaller in comparison to the remaining group of more strategic and profit-oriented investors. This result agrees with the research results of Tykvová (2004) who, inter alia, argues that public investors would take a lower equity position due to their focus on silent investments. With regard to the syndication of deals during the post-crisis phase, the results showed that this proportion was smaller on the level of the public and the semi-public investors with on average 43% per year in comparison to the remaining sample group with on average 76% per year (see table 109 in appendix P). These results agree with earlier research results too which already showed that the syndication proportion of the public and the semi-public investors was smaller in comparison to the profit-oriented and more strategic investors (Achleitner et al. 2006; Achleitner et al. 2010; see also table 15 in section 4.3). This difference in the syndication proportion might be a consequence of the larger investment proportion of the public and the semi-public investors (see table 77 in section 6.5.3), which surely corresponds with their status as supporters but contradicts the risk orientation of their counterparts. Therefore, a major proportion of their investments might be unattractive or too risky for the remaining market members and hence possible syndication partners.

On the level of the initial and the detailed screening, the research results underlined the overwhelming importance of the management team and of the strategy. This applies for the initial as well as for the detailed screening and for both sample groups (see tables 110 and 111 in appendix P). This research result agrees with the research findings of Schilder (2006) who points out that both groups in his sample, namely public venture capitalists as well as independent investors and CVCs, would expect a clear strategy and a very qualified management team. With regard to the phase of negotiation, interestingly enough, public and semi-public investors were less exposed to the termination of negotiations due to a particular contract right (see table 112 in appendix P). This might be a result of their focus on silent investments which in the normal case are not associated with particular investor rights or dilution protection clauses. Therefore, there should be less room for disagreement between the negotiation parties. On the other hand, these results showed that both sample groups were exposed to market competition because deals were finalised by competitors. This means that capital seeking firms obviously realised contacts with different investors during the capital acquisition process. This was already mentioned from

Achleitner et al. (2006). Beside this internal market competition, PE and VC investors obviously were also exposed to external market competition with the bank sector. The most important reason for breaking off negotiations was that finally no investor realised the deal. Presumably, as a consequence that the investment reason finally fell away (Achleitner et al. 2006) or that the capital seeking enterprises decided for bank loans. This assumption should be considered in the context with the significantly improved financing conditions on the credit market as a consequence of the current monetary policy.

The research results of the present study also agree with earlier research results (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010) regarding the number of received business plans. This number was larger on the level of the more strategic and on profit-oriented investors in comparison to the public and the semi-public investors. On the other hand, the investment proportion of the latter group was larger (see table 77 in section 6.5.3), probably, as a consequence of their support-oriented investment strategy. This result regarding the larger investment proportion agrees with the examination results of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010) too.

With regard to the post-investment phase, the results showed that the public and the semi-public investors seemed overall less often involved in their portfolio in comparison to the remaining sample group. Moreover, they tended to be less concerned with board establishment and management recruitment which might be a consequence of their focus on minority investments. Nevertheless, both groups were surely concerned with portfolio companies' strategy and finances (see table 113 in appendix P). These results agree with the research findings of Schilder (2006) too. Finally, the results showed that buy-backs and the repayment of silent investments played a larger role during the exit phase for the public and the semi-public investors, whereas trade sales played a larger role for the more strategic and profit-oriented investors (see table 114 in appendix P). This was obviously a consequence of public and semi-public investors focus on silent investments with limited exit options. Overall, this result regarding exit routes agrees with earlier research findings of Achleitner et al. (2006 and 2010). These researchers already referred to the dominance of buy-backs and of repayments for the group of the public and the semi-public investors.

7.2.5 The discussion regarding the Mittelständische Beteiligungsgesellschaften

With regard to a further separation of the entire sample, the results of the present study showed that the Mittelständische Beteiligungsgesellschaften differed regarding several aspects from the entire equity market. This was, inter alia, shown by their significantly larger number of investments (see table 92 in appendix O) and the incomparable larger number of portfolio companies (see table 91 in appendix O). Their obviously different investment behaviour was not only associated with smaller investment amounts per deal (see table 95 in appendix O) in comparison to the entire market (see table 74 in section 6.5.3) but also with significantly larger investment proportions (see table 77 in section 6.5.3). This investment proportion of the MBGs was on average 12% during the post-crisis phase of 2010 to 2012 (see table 77 in section 6.5.3). This research result regarding MBGs disproportionately larger investment proportion agrees with earlier research results of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). The average deal size of the MBGs in the amount of approx. 260 TEUR during the post-crisis phase (see table 95 in appendix O) on the other hand shows that the MBGs still operated in smaller investment classes. This was already shown by the research results of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010). With their average investment amount per deal, the MBGs exactly matched the indicated investment gap in Germany's PE and VC market (see table 16 in appendix G.3). In addition, the research results showed that the MBGs in general considered every kind of financing purpose but that they, nevertheless, seemed to be focused on expansion, MBO and MBI, and also on start-up financing (see table 63 in section 6.5.2). This corresponds with earlier research results too. These earlier research results already showed that the MBGs were not only focused on expansion financing but that MBO and MBI investments stepwise replaced the start-up and seed financing activities of the MBGs during 1999 until 2009 (Zimmerman and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). Moreover, the MBGs considered almost every industry branch rather than being focused on a specific industry sector (see table 104 in appendix P). Thus, they obviously took an exceptional role in Germany's equity market in order to fulfil a status of self-helping institutions for SMEs (see section 4.2). This type of investor was virtually uninfluenced from financial crisis related impacts in comparison to their earlier investment behaviour and strategy (Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010). The subsequent table 141 summarises the present research results regarding the MBGs, the public and the semi-public investors and finally the CVCs and the independent investors.

The comparison of the sample sub-groups			
Type of investor	MBGs	Public/Semi-public	CVC/Independent
Examination area	Average results for 2010 to 2012 based on mean values		
Received business plans:	260	162	483
Investment proportion in %[1)]:	12	9	3
Syndication proportion in %[2)]:	43	43	76
Fund volume in MEUR:	63	88	147
Investment volume in MEUR:	19	16	45
Number of portfolio companies:	378	227	32
Number of investments:	73	39	7
Deal size in TEUR:	260	410	6,428
Investment classes:	< 1.5	< 1.5	< 5
Type of equity investment:	Silent	Silent	Silent
Type of equity investment:	Minority	Minority	Minority + open
Industry branches:	Every sector	Mechanics/Industry automation; IT, software, electronics.	Specialised
Most important review field:	Management team		
Most important break-off reason:	No investor realised the deal		
Most important mentoring area:	Finance & controlling		Board establishment
Most important exit channel:	Buy-backs/repayment		Trade sales

1) From the number of received business plans.

2) From the total number of investments.

Table 141 The comparison of the sample sub-groups (own development)

Even though the financial crisis was associated with significant impacts on the German PE and VC market (Achleitner et al. 2010; Hummel 2011b and table 11 in appendix G.2), it could not be confirmed that market members adjusted their earlier investment strategy and their investment behaviour (see section 4.6.4). Since the public and the semi-public investors were still focused on smaller deal sizes in combination with a comparatively larger investment proportion, they obviously still fulfilled their role as supporters in the German PE and VC market. This conclusion is underlined by their smaller syndication proportion which might be a result of their less profitable and hence support-worthy investment targets. The so-called Mittelständische Beteiligungsgesellschaften in particular still met the requirements of self-helping institutions for SMEs. The larger risk aversion of the profit-oriented and more strategic investors on the other hand was not only expressed by their smaller investment proportion but also by their larger syndication proportion. In addition, the profit-oriented and more strategic investors concentrated on specific industry branches in order to achieve specialisation advantages. This means that

neither the group of the profit-oriented and more strategic investors nor the group of the public and the semi-public investors, and the Mittelständische Beteiligungsgesellschaften changed their earlier investment strategy and investment behaviour.

On the basis of these considerations, the subsequent sections are concerned with the implications for theory and practice. The focus in that regard is on the public funding initiatives and their effectiveness.

7.3 The implications for theory and practice

The subsequent sections critically evaluate the governmental funding initiatives which were introduced as a consequence of the financial crisis. At first, the focus is on the public funding for enterprise founding, which is followed from a critical look on the funding for both equity and innovation financing. This procedure considers recommendations for public decision makers out of a supply and demand-side perspective.

7.3.1 The entrepreneurial debate and the demand-side perspective

Overall, the present study showed that the German government expanded the public funding initiatives for enterprise founding, equity financing and for innovation projects. This applies both for the initial phase of the financial crisis and for the post-crisis phase of 2010 to 2012 (see table 48 in section 6.2.3; table 55 in section 6.3.4; tables 56 and 57 in section 6.4). Nevertheless, the questions still remain if this expansion of the public funding measures was appropriate and if these governmental initiatives addressed the underlying market gaps.

In context to enterprise foundings, data initially show that the annual proportion of enterprise founders from the entire population in the age of 18 to 64, declined from 2.8% in 2002 to 1.5% in 2015. This declining proportion, which considers enterprise foundings, enterprise takeovers and shareholdings, counted for both fulltime and sideline enterprise foundings (Metzger 2016). Additional data regarding the entrepreneurial activity not only correspond with these results but, moreover, put these developments in an international perspective. In that context, the so-called total-early-stage entrepreneurial activity considers both the number of so-called nascent entrepreneurs and of young entrepreneurs in different countries. This proportion of nascent and of young entrepreneurs, which may not be confused with the proportion of enterprise foundings,

from the population in the age of 18 to 64 was 4.7% in Germany in 2015. Thus, Germany took the final rank out of 23 so-called innovation-based economies in 2015. This TEA ratio for example was approx. three times bigger in Canada, approx. two and a half times bigger in the US and still one and a half times bigger each in Switzerland, the Netherlands and Sweden. In addition, this ratio not only declined in Germany since 2011 but, moreover, also represents the long-term mean of the TEA ratio in Germany for the period of 1999 until 2015 (Sternberg et al. 2016). It is therefore concluded that the entrepreneurial activity is not a short-term problem field in Germany even though it is argued that the overall declining ratios in that respect would be due to the positive economic climate and the robust labour market (Metzger 2016; Sternberg et al. 2016). Surely more critical in that context was the development of the balance of enterprise foundings and of liquidations (see subsequent table 142). On the level of the so-called commercial enterprise foundings, data show that the balance of enterprise foundings and of liquidations on the level of the fulltime foundations improved between 2007 and 2011, but finally resulted in negative balances in each year between 2012 and 2016. Hence, the number of liquidations without the number of insolvencies outweighed the number of enterprise foundings (IfM 2017a; IfM 2017b; see also section 2.6.3). On the other hand, the balance of sideline enterprise foundings and of liquidations declined between 2007 and 2016, while the number of freelancers increased by approx. 390,000 during the same period (see subsequent table 142). Thus, the future potential for additional fulltime enterprise foundings, as a result of earlier sideline enterprise foundings, seems to be limited too.

The enterprise statistics				
Year	Fulltime enterprise foundings minus liquidations[1)]	Sideline enterprise foundings minus liquidations[1)]	Number of liberal professions	Number of insolvencies
2007	10,770	125,257	954,000	29,160
2009	19,176	123,678	1,053,000	32,687
2011	18,151	89,515	1,143,000	30,099
2012	-24,135	83,640	1,192,000	28,297
2013	-15,744	82,952	1,229,000	25,995
2014	-38,237	77,879	1,265,000	24,085
2015	-29,406	69,239	1,309,000	23,123
2016	-28,508	67,923	1,344,000	-

1) Without liberal professions.

Table 142 The enterprise statistics (derived from IfM 2017a; IfM 2017b; IfM 2017c; IfM 2017d)

In context to a liberal market economy this alone, beside the declining innovation activity and the innovation success (see tables 130 and 131 in section 7.1.2), is surely a serious development and should therefore be immediately put on top of politicians' agenda. To what extent the significantly increasing number of freelancers might have compensated for the decreasing amount of commercial enterprise foundings is surely questionable (see also section 2.6.3). How far freelancers at the end contribute to the technology transfer in order to increase economy's competitiveness remains an open question too due to the blind spot in the innovation statistics (see section 2.6.2).

These entrepreneurial related long-term developments were surely not solely caused by the positive condition of the labour market and the lack of financing measures respectively but might have other fundamental reasons. In that context, Sternberg et al. (2016), as a result of national and international expert interviews, argue that Germany would lack a fundamental entrepreneurial education. Moreover, surely more important, Sternberg et al. (2016) point out that Germany's society would suffer from a negative attitude regarding entrepreneurs. Even though these assessments are rather subjective due to the so-called expert opinions and the limited number of interviews, this result surely stresses an interesting problem field in Germany's society. As a result of their research study, Sternberg et al. (2016) finally conclude and argue that self-employment in Germany would not have a real value as an employment alternative and that failed enterprise foundings would be assessed as a personal failure rather than an additional life experience. This would be complemented from a lack of entrepreneurial education. Therefore, it seems questionable if more financial resources in a risk adverse society will cause a rethinking and will stimulate more enterprise foundings. As a result, rather than focusing on the supply-side of public funding measures, it seems surely advisable to focus on the demand-side of the market too. A possible starting point might be to change society's attitude on the one hand and to improve the entrepreneurial qualification on the other hand. Such a procedure should not be limited to schools and universities but should also consider a professional environment too. An already established mean in the US and the UK in that respect are the so-called entrepreneurs in residence. In order to qualify future entrepreneurs, established enterprises offer contracts for a limited qualification period. During this time, future entrepreneurs gather experience in order to successfully run their own business later on (Hoffmann 2012). Such a kind of entrepreneurial qualification is still in its infancy in Germany (Hoffmann 2012) but might be helpful to create more entrepreneurial activity, entrepreneurial ability and acceptance.

Nevertheless, these developments should not be considered in isolation but also in context to Schumpeter's assumptions regarding the relevance of innovative entrepreneurs (Schumpeter 1985; Schumpeter 1987; see also section 2.6.1). Metzger (2016) in that context argues that despite the overall negative development of enterprise foundings in Germany, their structural quality would have improved. He (Metzger 2016) points out that the number of so-called opportunity founders was increasing, while the number of so-called necessity founders was decreasing between 2008 and 2015. Moreover, the proportion of enterprise founders who were unemployed before starting their own business declined from approx. 21% in 2008 to approx. 10% in 2015. In economic terms, opportunity founders would be associated with a minor loss probability, a larger employment probability and would also introduce innovations more often (Metzger 2016). Sternberg et al. (2016) agree with this assumption of structural quality's improvement. In that regard, they base their conclusion on the necessity/opportunity ratio which increased from 1.62 in 2006 to 4.68 in 2015. Interestingly enough, the ratio's increase was not caused by a declining proportion of necessity founders but rather from an increasing proportion of opportunity founders since 2011 on. As a result, Sternberg et al. (2016) see an improvement of enterprise foundings structural quality too (Sternberg et al. 2016).

As a result, it is recommended to consider alternative and more effective approaches of governmental support to stimulate the entrepreneurial activity in Germany. This should surely not be associated with a one-sided increase of public funds but rather with the attempt to carefully address both supply and demand-side factors.

The subsequent section now steps into the debate regarding the public equity funding measures.

7.3.2 The equity funding debate and the demand-side perspective

The clarifications in section 4.3 have already shown that between 1999 and 2009, a major stake of PE and VC investors in Germany applied for public funding measures (see table 14 in section 4.3). The importance of public funding was confirmed in the present study for the post-crisis phase of 2010, 2011 and 2012 (see table 75 in section 6.5.3). In addition, it became clear that the public funding initiatives for equity financing purposes were significantly expanded during the post-crisis phase (see tables 56 and 57 in section 6.4). In context to the present study, market failure due to information asymmetry and transaction costs (see table nine in section 3.3.2 and figure eight in appendix I) might justify public funding measures. This applies in particular in the

field of early-stage financing (Neck and Schneider 2013). With regard to the German PE and VC market it is argued that the German equity market and in particular the segment of early-stage financing would be comparatively small and that therefore, more support would be required (Metzger and Bauer 2015). Without detailed empirical evidence, Metzger and Bauer (2015) for example argue that demand for equity financing measures would generally exist but that the equity market in Germany would suffer from a supply-side bottleneck. This would be expressed by a lack of exit perspectives and due to both legal and tax constraints. How far in that connection self assessments of the market participants regarding market gaps, as in the case of the KfW studies of Zimmermann and Fischer (2003), Achleitner et al. (2006) and Achleitner et al. (2010) (see also table 16 in appendix G.3), were helpful to determine market gaps in Germany's PE and VC market seems overall questionable. Such blanket assumptions should be basically considered with great care. As earlier calculations have already shown, it is surely true that the German PE and VC market is comparatively small (see table 12 and table 13 in section 4.1). On the other hand, aggregated calculations for 2007 until 2015, showed that the proportion of venture capital in Germany's market was more robust as it initially seemed (see table 138 in section 7.1.3). In addition, data show that the proportion of raised funds for venture capital, the proportion of venture capital investments and the number of venture capital investments each outweighed the comparative results at least for the timeframe 2007 until 2015. These aggregated results in comparison to the results of the UK and France are summarised in the subsequent table 143.

The equity markets' aggregated values for 2007 until 2015			
Country	UK	France	Germany
Funds raised in MEUR	219,971	56,833	20,418
VC funds raised in MEUR	10,028	9,654	7,488
VC proportion in %	5.0	17.0	37.0
Total investments in MEUR	102,643	68,672	60,031
VC investments in MEUR	8,322	6,896	6,807
VC proportion in %	8.0	10.0	11.0
Number of investments	6,441	7,234	11,638
Number of VC investments	3,539	3,394	7,726
VC proportion in %	55.0	47.0	66.0
VC average investment volume in MEUR	2.352	2.032	0.881

Table 143 The equity markets' aggregated values for 2007 until 2015

(InvestEurope 2016; own calculations)

Under the assumption that the additional public funding measures which were introduced both in the initial and the post-crisis phase (see tables 56 and 57 in section 6.4) were not completely exhausted due to time lags, the German venture capital proportion should in reality be larger than calculated. It seems therefore questionable to argue that the German equity market in the field of early-stage financing would be too small.

Nevertheless, Metzger and Bauer (2015) point out that the provision of public equity funding would crowd in private investment capital on the one hand and would stimulate more enterprise foundings as a result of the improved financing conditions on the other hand. Against this crowding-in argument for public funding measures, Plagge (2006) argues that a major problem of every kind of governmental venture capital funding would be an adverse selection problem. He (Plagge 2006) points out that only less qualified and less successful investment managers would request public support, whereas the most successful PE and VC firms would be able to collect the investment capital on the private market. As a result, the management assistance of the publicly refinanced VC and PE firms would be weak and would result in less successful portfolio companies. This seems to be a wrong interpretation of the adverse selection phenomenon and it is therefore concluded that Plagge (2006) instead believes that the public refinancing measures would reduce the profit expectations of the PE and VC firms. As a result, both publicly supported and public investors might not only focus on less profitable investments but would also attract most promising companies due to the lower cost burden. This might distort the entire market and would crowd out rather than stimulate private initiative. Overall, Plagge (2006) does not see a supply-side bottleneck in Germany's PE and VC market and argues that the amount of raised funds would have outweighed the PE and VC investments in each year between 1980 until 1987. This might be a reasonable assumption but lacks detailed empirical evidence on the long run and is overall not possible due to secondary data difficulties. At first, the uncritical view on the BVK data would support such an assumption as in eight years of the period between 1994 and 2004, the fundraising volumes outweighed the investment volumes in Germany's equity market (BVK 2004). By looking on the EVCA data, for example for the period between 2007 and 2015, this development turns into the opposite. In every of the years between 2007 and 2015, the investments were significantly larger in comparison to the fundraising volumes (InvestEurope 2016). As a result, it was surely a simplification of reality to conclude a supply-side overhang by the unquestioned comparison of the fundraising with the investment volumes. The difficulty in both the EVCA and the BVK data in that regard is that the investment amounts consider the entire market. This means that daughter companies in the PE

and VC market which are not required to raise funds due the mother company's funding are considered in the statistics too. As a result, direct comparisons between the fundraising and the investment volume are meaningless as long as the investments of the dependent PE and VC firms are considered without a fundraising equivalent. Nevertheless, Plagge (2006) argues that the German PE and VC market would not have suffered from a supply-side bottleneck but rather from demand-side constraints. In that regard, he (Plagge 2006) makes clear that the main point behind this kind of public funding is to ensure enterprise financing and not the development of the equity market per se. Such a public funding focus would, however, require enough interesting investment targets. This thought in turn is associated with a basic problem in Germany's economy regarding enterprise financing. Earlier research regarding the application of equity financing in Germany has already shown that equity financing in general played a minor role for SMEs. Financing, so far, was dominated from self and from bank financing, and also from supplier credits (Hummel 2011a). Metzger and Bauer (2015) in that context argue that Germany's PE and VC market represented approx. 1% of the entire credit volume for enterprise financing in 2014. Research results have shown that one major reason for this minor importance of equity measures was entrepreneurs' believe that an equity investment would be associated with a loss of autonomy and power (Hummel 2011a). This attitude of enterprise owners in Germany was and still might be an additional obstacle for the development of the equity market. In terms of a demand-side factor it seems reasonable to advertise for more acceptance of equity financing as an alternative for small and medium-sized enterprises.

If public-owned institutions, as in the case of the KfW, argue that the comparatively smaller equity market in Germany would be, inter alia, a result of limited exit options and legal and tax constraints (Metzger and Bauer 2015), then public decision makers should consequently focus on these obstacles rather than providing additional public funds. The literature review in that regard has already shown that Germany has no comprehensive private equity and venture capital law and that the market members have seen the AIFM-directive as a possible chance to create an all encompassing legal framework (see section 6.6.1). The lack of such a comprehensive law should be regarded as a central point. Too many individual laws as a replacement for an all-encompassing law not only contradict a reliable legal framework but cause legal uncertainty and hamper the aim of more private initiative.

With regard to the development of Germany's stock market it is surely correct that the number of IPOs declined from 142 in 2000 to zero in 2003 and that this number since then did not really

recover (Statista 2017a). The same development applies for the number of shareholders in Germany which initially increased from approx. 3.92 million in 1997 to 6.21 million in 2000, but finally declined to approx. 4.41 million in 2015 (Statista 2017b). These developments are summarised in the subsequent table 144.

The number of IPOs and shareholders in Germany		
Year	Initial public offerings	Shareholders in million
1997	36	3.92
2000	142	6.21
2003	0	5.05
2006	32	4.24
2009	1	3.62
2012	8	4.53
2015	15	4.41

Table 144 The number of IPOs and shareholders in Germany
(derived from Statista 2017a; Statista 2017b)

Given that there is a correlation between a flourishing IPO market and the development of the equity market and that this condition in Germany would be unattractive, then it seems questionable why more regulation of Germany's stock market was introduced and why private investors are excluded during IPOs (Blättchen 2015; see also section 2.6.3). As a result, comparisons between Germany's IPO market and the market in the US, as carried out by Metzger and Bauer (2015), are surely interesting but meaningless.

It may therefore be recommended that the governmental measures from a demand-side perspective should focus both on more entrepreneurial activity and the promotion of equity financing as a funding alternative. In terms of a supply-side perspective, the government should focus on the stimulation of more private initiative outside the formal PE and VC market. The governmental initiatives in order to support business angels' investments (see tables 56 and 57 in section 6.4) were surely a reasonable initial attempt. Thus, the application of a well-balanced mix of both supply and demand-side initiatives should surely be more appropriate rather than providing public money according to the watering can principle. In that context, a look on the proportion of venture capital write-offs shows that on average 30.1% of the divestments in Germany were written off between 2007 and 2015. This average proportion not only outweighs the European average result of 16.4% but, moreover, outweighs the average results of the UK

and France with 11.9% and 10% respectively (see table 145 in appendix R). Under these circumstances, a strong qualitative orientation of the public measures seems surely recommendable.

7.3.3 The research funding debate and the demand-side perspective

The statistics in section 7.1.2 already showed that the SMEs, despite their numerical dominance in Germany's economy (Söllner 2011), unfolded less innovation activities (see table 130 in section 7.1.2), realised smaller innovation expenses (see table 132 in section 7.1.2) and finally realised smaller success contributions from both product and process innovations (see table 131 in section 7.1.2). In economical terms, the R&D contribution of SMEs was insufficient and might be a result of market failure due to positive externalities.

In that regard, the present research study showed that Germany's government not only expanded the most prominent research subsidies on the federal level, both the ZIM and the so-called KMU-innovativ (see table 48 in section 6.2.3) but, furthermore, improved their application too (see table 43 in section 6.1.2; table 44 in section 6.1.3; table 45 in section 6.1.4). Nevertheless, data showed that the revenue proportions of product innovations were declining between 2000 and 2014 (see table 133 in section 7.1.2) as did the contribution of process innovations on cost reductions (see table 134 in section 7.1.2). Moreover, data showed that the research contribution of the SMEs, out of an enterprise-size related perspective, and parts of the industry and the service sector, out of a sector related perspective, was partly too small and was overall decreasing since the millennium turn (see section 7.1.2). As a result, there appeared to be a research dominance of specific industry sectors and thus, a one-sided economical dependence (see table 135 in section 7.1.2).

Even if possible time lag effects might have existed and the bulk of public measures were not considered in the ZEW statistics of Rammer et al. (2010), Rammer et al. (2014) and Rammer et al. (2016), the underlying development raises the question if the public efforts achieved the desired outcome. Under the assumption that the public efforts have slowed down the further decrease of R&D, which could not be realised in the underlying statistics, the risk of freeriding still remains. This means that in context to research subsidisation, enterprises consider the public funds as a welcomed contribution to their innovation expenses even though a real demand is not existing (Neck and Schneider 2013). In addition, less innovative and less hopeful projects might

be financed due to the bulk of public funds. Moreover, the research results of Hummel (2011b) raise the question regarding possible crowding-out effects due to the public subsidies. Even though more indicative rather than representative for the entire population of SMEs in Germany, Hummel's (2011b) research results have shown that public funding overall played a minor role for the financing of smaller innovation projects. Even though public funding's importance increased in relation to the project size, self-financing with capital gains was the most important financing channel for innovation projects on the level of the SMEs. This was at least the case at the moment of his research examination in 2010.

As already mentioned, there seem to be long-term related problems rather than isolated effects as a consequence of the financial crisis. Thus, a policy in accordance with the watering can principle should be avoided on the level of the research subsidisation too. A major reason of the declining research and development efforts, in particular on the level of the SMEs, might be deficits in the property rights legislation. This assumption should apply in particular in a globalised environment which makes a final enforcement of property rights difficult. As a result, property rights and their enforcement might be an area for increased governmental attention.

The subsequent section finally reappraises the public funding measures for innovation and equity financing purposes. This procedure also reconsiders the current innovation policy and presents the further developments of public funding until 2017.

7.3.4 The reappraisal of the public funding policy

This section reappraises the study outcomes regarding the public funding initiatives on the federal level for both innovation and equity financing purposes. Therefore, earlier developments since the millennium turn were reevaluated in connection to the further progress until 2017, the moment of the reappraisal.

In accordance with the earlier discussion, it is surely possible to argue that following problem areas in Germany already existed earlier than the financial crisis of 2008 and 2009. These problem fields are:

a) a decreasing innovation activity and success (see section 7.1.2);
b) a decreasing entrepreneurial activity (see section 7.3.1);

c) a comparatively smaller private equity market (see section 7.3.2).

In addition, it is surely possible to argue that the innovation political strategy of the government was not only influenced by financial crisis related impacts but already due to the economical consolidation after the millennium turn. This earlier development required the government to ensure more competition and academic excellence within the public universities and public research organisations. In addition, this development moved the importance of technological enterprise foundings, the technology transfer from research organisations and the weak innovation contribution of SMEs in the limelight of the contemplation (BMBF 2004). In that respect, the financial crisis surely caused a further sensitisation of the political decision makers but did not cause a basic adjustment of the earlier innovation political strategy. The introduction of the Hightech-Strategy 2020 in 2010, stabilised the earlier political perspective regarding the innovation potential of the SMEs, the importance of enterprise foundings and, furthermore, underlined the requirement of industry's digitalisation (BMBF 2016). In addition, the government was still concerned with the further increase of research expenses in order to reach the 3% aim of the European strategy 2020 (BMBF 2004; BMBF 2016; see also sections 6.1.1 and 6.1.2).

Nevertheless, the long-lasting innovation political strategy obviously did not achieve the desired results. Even though the federal level in Germany alone increased the public research expenses from annually approx. nine billion euros in 2005 to annually approx. 15.8 billion euros in 2016, and thus by approx. 75% (BMBF 2016), the demand-side of the market was obviously not addressed.

Despite the expansive public measures, it was obviously neither possible to improve the innovation activity in general nor on the level of the SMEs in particular. In addition, it was not possible to prevent the significant decline of research activities during the financial crisis and the post-crisis phase (see table 130 in section 7.1.2).

Nonetheless, the government still followed the earlier strategy. On the level of the research subsidy ZIM, the government not only prolonged its application in 2015 until 2019, but expanded the circle of eligible institutions and enterprises, increased the refundable cost basis and finally simplified the application procedure (BMBF 2016). To what extent such proceedings should have improved Germany's innovation capacity (BMBF 2016) seems most questionable.

As in the case of the public research support, a quite similar governmental behaviour could be realised on the level of the equity financing measures. The reappraisal of the literature showed that the German government already launched a venture capital fund of fund in 2004, and hence in a situation of economical consolidation, equity market's decline and Neue Market's collapse. This public venture capital fund of fund, with a fund volume of 3.2 billion euros, was financed by the European Recovery Programme's special assets and the European Investment Fund (BMBF 2016; EIF 2016; BMWi 2017a). Such a further governmental proceeding could then be realised both during the initial and the post-crisis phase of 2010, 2011 and 2012, and, moreover, for the period until 2017 (see table 56 in section 6.4). The total public funding measures for equity financing meanwhile reached an amount of approx. 5.84 billion euros for the period between 2004 and 2017 (see subsequent table 146). A detailed overview of the public funding measures' development is enclosed in the appendix (see table 147 in appendix S.1, table 148 in appendix S.2 and table 149 in appendix S.3).

The periodical consolidation of the public venture capital measures		
Period	Timeframe	Fund volumes
		in MEUR
Pre-crisis phase	2004 – 2005	2.152
Financial crisis	2008 – 2009	220
Post-crisis phase	2010 – 2012	1.307
Subsequent phase	2013 – 2017	2.160
Total		**5.839**

Table 146 The periodical consolidation of the public venture capital measures
(own development; derived from table 147 in appendix S.1)

The major stake of this funding volume refers to the phase of the financial crisis and the subsequent periods until 2017. Moreover, more than 80% of the public funding measures between 2004 and 2017, are associated with seed, start-up and expansion financing, whereas the remaining shares are concerned with growth financing and other financing purposes (see subsequent table 150).

The financing focus of the public equity measures					
Financing purpose	Seed/Start-up/Expansion	Growth	Others	**Total**	Proportion
Period	in MEUR				
Pre-crisis	2.152	0	0	**2.152**	36.8%
Financial crisis	220	0	0	**220**	3.8%
Post-crisis	805	500	2	**1.307**	22.4%
Subsequent	1.560	600	0	**2.160**	37.0%
Total	**4.737**	**1.100**	**2**	**5.839**	100.0%
Proportion	81.1%	18.8%	0.1%	100.0%	

Table 150 The financing focus of the public equity measures
(own development; derived from table 147 in appendix S.1)

It seems doubtful if the earlier progress of Germany's equity market has justified such a significant expansion of the public funding measures. Data show that Germany's PE and VC market in terms of investment volumes increased since the middle of the nineties until the millennium turn. The subsequent periods show that the German PE and VC market, despite the consolidation phases of 2002 until 2003 (BVK 2004) and 2009 until 2010 (EVCA 2013), not only recovered quite quickly but further increased and finally consolidated on a comparatively higher investment level (BVK 2004; InvestEurope 2016).

Yet, the government obviously neglected the demand-side of the market again. In doing so, the risk of crowding-out and of free riding still exists. In order to avoid such developments, the qualitative orientation may not be lost in the light of the public funding initiatives. Rather than expanding the public funds during unstable economic conditions in order to support for example specific enterprise sizes, as in the case of the research subsidisation, the government should be rather concerned with Germany's dependence on specific industry sectors. This means that an additional governmental aim should be to support the creation of a wider industrial basis. The earlier dominating industry sectors after the millennium turn were quite the same approx. one decade later (see table 135 in section 7.1.2). Quite problematic in that regard seems to be the dominance of the automotive sector. The current diesel debate shows what might happen in the case that dominating industry sectors fail. Presumably, the basis for a further expansion of the public funding measures?

Chapter 8 The limitations and recommendations for further research

8.1 The limitations of the present research study

The most important aspect is surely the explorative and descriptive nature of the present study. This research study could be criticised due to the accumulation of facts and the purposive sample selection which did not allow for general conclusions. Moreover, this study with regard to public funding programmes was exclusively focused on the federal level. Funding programmes on the local district level, the federal state level and programmes which were explicitly launched for the development of Germany's eastern part were not considered. Therefore, this study did not allow for conclusions regarding the progress of the entire programmes in the present research area.

8.2 The recommendations for further research

The present research study has, inter alia, shown that the so-called Mittelständische Beteiligungsgesellschaften differed in several aspects from the remaining market members (see section 7.2.5). In the context of these so-called Mittelständische Beteiligungsgesellschaften in Germany, the present study also showed that there was a comparatively smaller proportion of separated research regarding this kind of equity investor. This might be a consequence of their more support-oriented investment strategy on the one hand and their regional investment focus on the other hand. Due to their support function and their focus on the financing of SMEs, it would be interesting to examine the MBGs in greater detail. Regarding the current developments, such an examination might consider MBGs role in the technology transfer process on the one hand and the importance of innovative aspects in their decision making process on the other hand. Moreover, it might be worth knowing to what extent the MBGs are meanwhile operating in the venture capital scene and in this case to examine how successfully they are.

According to the present study results, which showed a significant expansion of the public funding for VC investments (see table 146 in section 7.3.4), an examination regarding their final success contribution is surely of interest. Such a research perspective might be concerned with private investors' involvement on the one hand (see consecutive no. 86 and 87, in table 45 in section 6.1.4) and the attempt to develop a market for the financing of social enterprises on the other hand (see table 56 in section 6.4). The question would be whether the additional funds have stimulated additional financing capital or caused a declining amount of private investments. In

that context, it would be advisable to examine if the significant expansion of the federal research subsidies ZIM and KMU-innovativ and the improvement of their application (see consecutive no. 79, in table 42 in section 6.1.1; see consecutive no. 72 and 73, in table 43 in section 6.1.2; see consecutive no. 78 and 79, in table 44 in section 6.1.3; see consecutive no. 83 and 84, in table 45 in section 6.1.4 and table 48 in section 6.2.3; see also section 7.3.4) have caused additional innovation activities. This question would be particularly interesting with regard to ZIM's further adjustment (see section 7.3.4) and whether this procedure has either caused successful innovation projects or freeloading.

Due to the blind spot in the innovation statistics of the ZEW (Rammer et al. 2005; Rammer et al. 2010; Rammer et al. 2014; Rammer et al. 2016) and the significantly increasing number of freelancers (see table 142 in section 7.3.1), it would be surely worth knowing in which way freelancers contribute to the diffusion of innovation and how far they are involved in research and development activities. In addition, more research would be helpful regarding the restrained research behaviour of the SMEs and regarding the possible influence of the property rights legislation and the effects of the globalisation.

Finally, it would be interesting to examine if and to which extent the public support of research organisations (see consecutive no. 82, in table 42 in section 6.1.1) and of the technology transfer (see consecutive no. 73, in table 44 in section 6.1.3) has caused additional enterprise foundings in university settings. Such a research perspective might also be concerned with the direct interaction of the research organisations with the financial sector. A more detailed view might be focused on the direct contribution of the public and the semi-public PE and VC investors in order to support the technology transfer from universities and research organisations. Moreover, such an examination might be focused on additional activities of the public and the semi-public investors outside their financing business. For example, regarding their involvement in the entrepreneurial qualification, in business plan competitions or the advisory of enterprise founders. Such an examination should be based on a comparative study with foreign countries.

The references

Achleitner, A.-K. et al. (2006) Beteiligungsfinanzierung nach der Marktkonsolidierung, Anhaltende Defizite in der Frühphase, KfW (ed), Frankfurt/Main.

Achleitner, A.-K. et al. (2008) Community Development Venture Capital: Concept and status quo in Germany, CEFS working paper series, no. 2008-03, TUM (ed), Munich.
Available from: https://www.econstor.eu/bitstream/10419/48416/1/577539418.pdf, accessed 24 October 2016.

Achleitner, A.-K. et al. (2010) Beteiligungsmarkt nach der Krise: Optimistischer Ausblick aber Angebotslücke beim Wachstumskapital wird größer, KfW (ed), Frankfurt/Main.

Akerlof, G. A. (1970) The Market for Lemons: Qualitative Uncertainty and the Market Mechanism. In: Quarterly Journal of Economics, 84 (3), pp. 488–500.

Alemann, H. (1984) Der Forschungsprozess, Eine Einführung in die Praxis der empirischen Sozialforschung. In: Scheuch, E. K. and Sahner, H. (eds) Studienskripte zur Soziologie, Teubner publishing, Stuttgart.

Asmussen, J. (2008) Foreword. In: Keuper, F. and Puchta, D. (eds) Strategisches Management in Förderbanken, Gabler publishing, Wiesbaden, pp. V–XI.

Baetge, J. et al. (2001) Bewertungsverfahren, Teil B: Darstellung der Discounted-Cashflow-Verfahren (DCF-Verfahren) mit Beispiel. In: Peemöller, V. H. (ed) Praxishandbuch der Unternehmensbewertung, nwb publishing, Herne and Berlin, pp. 263–360.

Bafa (2014) INVEST – Zuschuss für Wagniskapital, Merkblatt zur Antragstellung für Investoren im Rahmen der Fördermaßnahme, Bafa (ed), Eschborn.
Available from:
http://www.bafa.de/bafa/de/wirtschaftsfoerderung/invest/publikationen/merkblatt_investor.pdf, accessed 4 March 2015.

Bafa (2017) INVEST – Zuschuss für Wagniskapital, Neuerungen 2017 (Invest 2.0), Bafa (ed), Eschborn.
Available from:
http://www.bafa.de/DE/Wirtschafts_Mittelstandsfoerderung/Beratung_Finanzierung/Invest/invest_node.html, accessed 27 July 2017.

Bafin (2014) Solvency II: Aufbau und Gesetzgebung, Bafin (ed), Bonn.
Available from:
http://www.bafin.de/DE/Internationales/Regelungsvorhaben/Solvency2/solvency2_node.html#doc2695976bodyText1, accessed 28 October 2014.

Bankenverband (2005) Mittelstandsfinanzierung – Partnerschaftliche Zusammenarbeit von Unternehmen und Banken, Daten, Fakten, Argumente, Bankenverband (ed), Berlin.

Bartling, H. and Luzius, F. (1993) Grundzüge der Volkswirtschaftslehre, Einführung in die Wirtschaftstheorie und Wirtschaftspolitik, 10th edition, Franz Vahlen publishing, Munich.

Bartmann, P. (2011) Die Verantwortung der Wirtschaftsinformatik für die Finanzkrise. In: Nietert, B. (ed) Die Eskalation der Finanz- zur Wirtschaftskrise, Fritz Knapp publishing, Frankfurt/Main, pp. 46–59.

Baur, Dirk G. (2012) Financial contagion and the real economy. In: Journal of Banking & Finance, 36 (10), pp. 2680–2692.

Behringer, S. (2009) Unternehmensbewertung der Mittel- und Kleinbetriebe, Management und Praxis, 69 (4), E. Schmidt publishing, Berlin.

Belitz et al. (2012) Volkswirtschaftliche Bedeutung der Technologie- und Innovationsförderung im Mittelstand. In: DIW Berlin (ed) Politikberatung kompakt 67, Berlin.

Bendel, O. (2015) Industrie 4.0. In: Gabler-Wirtschaftslexikon, Springer Gabler publishing (ed), Wiesbaden.
Available from: http://wirtschaftslexikon.gabler.de/Archiv/-2080945382/industrie-4-0-v1.html, accessed 7 December 2015.

Berens, W. et al. (2002) Funktionen, Terminierung und rechtliche Einordnung der Due Diligence. In: Berens, W. et al. (eds) Due Diligence bei Unternehmensakquisitionen, 3rd edition, Schäffer-Poeschel publishing, pp. 77–119.

BIS (2010) Group of Governors and Heads of Supervision announces higher global minimum capital standards, press release 35/2010, BIS (ed), Basel.

Blättchen, W. (2015) Börsenkapital für Wachstumsunternehmen: eine Langfristbetrachtung, commentary. In: VentureCapital Magazine, 7/8 (2015), p. 36–37.

Blume, T. (2003) Immanent. In: Rehfus, W. D. (ed) Handwörterbuch Philosophie, Vandenhoeck & Ruprecht publishing, Göttingen.
Available from: http://www.philosophie-woerterbuch.de, accessed 20 May 2014.

BMBF (2004) Federal research report 2004, BMBF (ed), Bonn and Berlin.
Availabe from: https://www.bmbf.de/pub/Bufo_2004_Langfassung.pdf, accessed 9 August 2017.

BMBF (2010) Federal research report 2010, BMBF (ed), Berlin.

BMBF (2012) Federal research report 2012, BMBF (ed), Berlin.

BMBF (2014) Federal research report 2014, BMBF (ed), Berlin.

BMBF (2015a) Arbeitsbereiche, Forschungs- und Innovationspolitik, Die Strategie Europa 2020, BMBF (ed), Bonn.
Available from: http://www.eubuero.de/eu2020.htm, accessed 27 November 2015.

BMBF (2015b) Horizont 2020, Einstieg, BMBF (ed), Bonn.
Available from: http://www.horizont2020.de/einstieg.htm, accessed 27 November 2015.

BMBF (2015c) Das Wissenschaftsfreiheitsgesetz, BMBF (ed), Berlin.
Available from: https://www.bmbf.de/de/das-wissenschaftsfreiheitsgesetz-466.html, accessed 27 November 2015.

BMBF (2016) Federal research report 2016, BMBF (ed), Berlin.

BMWi (2010) Annual economic report 2010, BMWi (ed), Berlin.

BMWi (2011) Annual economic report 2011, BMWi (ed), Berlin.

BMWi (2012) Annual economic report 2012, BMWi (ed), Berlin.

BMWi (2013) Annual economic report 2013, BMWi (ed), Berlin.

BMWi (2013a) Der Mezzanin-Dachfonds für Deutschland – neue EU-Gelder für den deutschen Mittelstand, press release published on 22 May 2013, BMWi et al. (eds), Berlin.
Available from: http://www.bmwi.de/DE/Presse/pressemitteilungen,did=577066.html, accessed 10 March 2015.

BMWi (2015) Zentrales Innovationsprogramm Mittelstand, Statistiken, BMWi (ed), Berlin.
Available from: http://www.zim-bmwi.de/download/infomaterial/statistiken/zim-web-stat-kw-11, accessed 10 March 2015.

BMWi (2017a) ERP/EIF-Dachfonds, European Angels Fonds, ERP/EIF-Mezzanin-Dachfonds für Deutschland und ERP/EIF-Wachstumsfazilität, BMWi (ed), Berlin.
Available from: https://www.bmwi.de/Redaktion/DE/Artikel/Mittelstand/innovationsfinanzierung-erp-eif.html, accessed 27 July 2017.

BMWi (2017b) Mezzanin-Dachfonds stellt zusätzlich 400 Millionen Euro für den deutschen Mittelstand bereit, press release published on 10 November 2016, BMWi (ed), Berlin.
Available from: https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/2016/20161110-mezzanin-dachfonds-stellt-zusaetzlich-400-millionen-euro-fuer-den-deutschen-mittelstand-bereit.html, accessed 27 July 2017.

Brandis, H. and Kawohl, F. (2003) Due Diligence-Prozess für Unternehmen der Net Economy. In: Kollmann, T. (ed) E-Venture-Management, Gabler publishing, Wiesbaden, pp. 443–452.

Brauner, H. U. and Lescher, J. (2002) Due Diligence aus finanzwirtschaftlicher Sicht. In: Berens, W. et al. (eds) Due Diligence bei Unternehmensakquisitionen, 3rd edition, Schäffer-Poeschel publishing, pp. 325–361.

Brenner, P. J. (2011) Hermeneutik, Interpretation, Verstehen. In: Reinalter, H. and Brenner, P. J. (eds) Lexikon der Geisteswissenschaften, Böhlau publishing, Vienna, pp. 314–323.

Brettel, M. (2002) Entscheidungskriterien von Venture Capitalists, Eine empirische Analyse im internationalen Vergleich. In: Die Betriebswirtschaft, 62 (3), pp. 305–325.

Brinkrolf, A. (2002) Managementunterstützung durch Venture-Capital-Gesellschaften, Dissertation, HSG, St. Gallen.

Brunetti, A. (2011) Wirtschaftskrise ohne Ende? 2nd edition, hep publishing, Bern.

Brunner, S. and Kehrle, K. (2012) Volkswirtschaftslehre, 2nd edition, Vahlen publishing, Munich.

Bundesagentur für Arbeit (2012) Amtliche Nachrichten der Bundesagentur für Arbeit Juni 2012, 60 (6), BA (ed), Nuremberg.

Bundesagentur für Arbeit (2013) Arbeitslosigkeit im Zeitverlauf. In: Arbeitsmarkt in Zahlen, Monats-/Jahreszahlen Juli 2013, BA (ed), Nuremberg.

Bundesregierung (2015) Lissabon-Strategie. In: Europa-Lexikon, Public relations department of the government (ed), Berlin.
Available from: http://www.bundesregierung.de/Content/DE/Lexikon/EUGlossar/L/2005-11-21-lissabon-strategie.html, accessed 3 December 2015.

BVK (2004) BVK Statistik, Das Jahr 2004 in Zahlen, BVK (ed), Berlin.

BVK (2009a) BVK Statistik, Teilstatistik - Aktivitäten der Mittelständischen Beteiligungs-gesellschaften 2008, BVK (ed), Berlin.

BVK (2009b) Private Equity - Eigenkapital für den Mittelstand, Ein Leitfaden für Unternehmer, BVK (ed), Berlin.

BVK (2010a) Der deutsche Beteiligungsmarkt 2009, BVK (ed), Berlin.

BVK (2010b) BVK Statistik, Teilstatistik - Aktivitäten der Mittelständischen Beteiligungsgesellschaften 2009, BVK (ed), Berlin.

BVK (2011a) Der deutsche Beteiligungsmarkt 2010, BVK (ed), Berlin.

BVK (2011b) BVK Statistik, Teilstatistik - Aktivitäten der Mittelständischen Beteiligungsgesellschaften 2010, BVK (ed), Berlin.

BVK (2012a) Der deutsche Beteiligungsmarkt 2011, BVK (ed), Berlin.

BVK (2012b) Eine Analyse der Beteiligungsdauer bei Private-Equity Finanzierungen in Deutschland, BVK (ed), Berlin.

BVK (2013a) Der deutsche Beteiligungsmarkt 2012, BVK (ed), Berlin.

BVK (2013b) BVK Statistik, Das Jahr 2012 in Zahlen, BVK (ed), Berlin.

Chmielewicz, K. (1979) Forschungskonzeptionen der Wirtschaftswissenschaft, 2nd edition, Poeschl publishing, Stuttgart.

Coase, R. H. (1937) The Nature of the Firm. In: Economica, vol. 4, Wiley-Blackwell, Oxford, pp. 386–405.

Corsetti, G. et al. (2009) Chapter 3: Private Equity. In: The EEAG Report on the European Economy 2009, CESifo Group Munich (ed), Munich, pp. 123–140.

Destatis (2011) Zugang kleiner und mittlerer Unternehmen zu Finanzmitteln, article no. 5482101-10900-4, Destatis (ed), Wiesbaden.

Destatis (2013) Volkswirtschaftliche Gesamtrechnungen. Lange Reihen ab 1950, Destatis (ed), Wiesbaden.

Deutsche Börse (2015) Deutsche Börse Venture Network, Über uns, Fakten, Deutsche Börse AG (ed), Frankfurt/Main.
Available from: http://www.venture-network.com/dbvn-de/ueber-uns, accessed 18 August 2015.

Dietrich, D. and Vollmer, U. (2012) Are universal banks bad for financial stability? Germany during the world financial crisis. In: The Quarterly Review of Economics and Finance, vol. 52, pp. 123–134.

Döhrn, R. et al. (2009) Die wirtschaftliche Entwicklung im Ausland: Globale Rezession. In: RWI Konjunkturberichte: Die wirtschaftliche Entwicklung im Ausland und im Inland zur Jahreswende 2008/2009, 60 (1), pp. 5–33.

Döhrn, R. et al. (2011) Die wirtschaftliche Entwicklung im Ausland: Aufschwung setzt sich fort – Divergenzen bleiben groß. In: RWI Konjunkturberichte: Die wirtschaftliche Entwicklung im Ausland und im Inland zur Jahreswende 2010/2011, 62 (1), pp. 55–38.

Döhrn, R. et al. (2012a) Die wirtschaftliche Entwicklung im Ausland: Schwächephase wird allmählich überwunden. In: RWI Konjunkturberichte: Die wirtschaftliche Entwicklung im Ausland und im Inland zur Jahreswende 2011/2012, 63 (1), pp. 3–42.

Döhrn, R. et al. (2012b) Die wirtschaftliche Entwicklung im Ausland: Krise im Euro-Raum dämpft Weltwirtschaft. In: RWI Konjunkturberichte: Die wirtschaftliche Entwicklung im Ausland und im Inland zur Jahresmitte 2012, 63 (2), pp. 5–38.

Döhrn, R. et al. (2012c) Die wirtschaftliche Entwicklung im Inland: Gedämpfte Expansion bei hohen Risiken. In: RWI Konjunkturberichte: Die wirtschaftliche Entwicklung im Ausland und im Inland zur Jahresmitte 2012, 63 (2), pp. 41–94.

Dömötör, R. (2011) Erfolgsfaktoren der Innovativität von kleinen und mittleren Unternehmen, Dissertation, Gabler publishing, Wiesbaden.

Dornbusch, R. et al. (2008) Macroeconomics, 10th edition, McGraw Hill International, Singapore.

EC (2003) Commission recommendation concerning the definition of micro, small and medium-sized enterprises, 203/361/EC, Official Journal of the European Union, C(2003) 1422, pp. 124/36–124/41.
Available from: http://eurex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:EN:PDF, accessed 7 March 2013.

ECB (2010) Survey on the access to finance of small and medium-sized enterprises in the euro area: second half of 2009, ECB (ed), Frankfurt/Main.

EFH (ns) Rating 1, Grundlagen und Notwendigkeit des Ratings, study material, RA 1/H, EFH (ed), Hamburg.

Eggert, W. and Minter, S. (2016) Deficit Spending. In: Gabler Wirtschaftslexikon, Springer Gabler publishing (ed), Wiesbaden.
Available from: http://wirtschaftslexikon.gabler.de/Definition/deficit-spending.html, accessed 29 April 2016.

Ehren, M. (2013) Ende des Schreckens namens NEMAX. In: boerse.ARD.de, Hessischer Rundfunk (ed), Frankfurt/Main.
Available from: http://boerse.ard.de/boersenwissen/boersengeschichte-n/im-maerz-2000-platzte-die-dotcom-blase-100.html, accessed 3 August 2016.

EIF (2015) European Investment Fund, Who we are, What we do, EIF (ed), Luxembourg.
Available from: http://www.eif.org/index.htm, accessed 7 December 2015.

EIF (2016) European Recovery Programme, ERP/EIF Fund of Funds, EIF (ed), Luxembourg.
Available from: http://www.eif.europa.eu/what_we_do/resources/erp/index.htm, accessed 9 August 2017.

EKD (2009) Wie ein Riss in hoher Mauer. Wort des Rats der evangelischen Kirche in Deutschland zur globalen Finanzmarkt- und Wirtschaftskrise, EKD (ed), Hannover.

Engelmann, A. and Heitzer, B. (2001) Beteiligungsprozess von Venture Capital-Gesellschaften und Business Angels bei Marktunvollkommenheiten. In: Finanz-Betrieb, 2001 (3), pp. 215–221.

Engler, F. O. (2010) Kritischer Rationalismus. In: Horster, D. and Jantzen, W. (eds) Wissenschaftstheorie, vol. 1., W. Kohlhammer publishing, Stuttgart, pp. 214–218.

Espel, P. (2006) Privates Beteiligungskapital im deutschen Mittelstand, Eine verhaltens-psychologische fundierte Betrachtung der nachfrageseitigen Nutzenintention, Dissertation, RWTH Aachen, Aachen.

EVCA (2013) European Private-Equity statistics: 2007 – 2012, EVCA (ed), Brussels.
Available from: http://www.evca.eu, accessed 10 August 2013.

Fehling, C. and Leymann, F. (2015) Cloud Computing. In: Gabler Wirtschaftslexikon, Springer Gabler publishing (ed), Wiesbaden.
Available from: http://wirtschaftslexikon.gabler.de/Archiv/1020864/cloud-computing-v9.html, accessed 7 December 2015.

Feldmann, M. et al. (2007) Private Equity, Ein Leitfaden für die erfolgreiche Nutzung von Beteiligungskapital im Mittelstand, IFD (ed), Frankfurt/Main.

Fey, G. (2014) Aktionärszahlen des deutschen Aktieninstituts 2013, Deutsches Aktieninstitut (ed), Frankfurt/Main.

Flick, U. (2008) Triangulation, 2nd edition, VS publishing, Wiesbaden.

Foerderdatenbank.de (2015) European Angels Fund (EAF). In: Förderprogramme und Finanzhilfen des Bundes, der Länder und der EU, BMWi (ed), Berlin.
Available from: http://www.foerderdatenbank.de/Foerder-B/Navigation/Foerderrecherche/suche.html?get=views;document&doc=11643, accessed 4 March 2015.

Franke, N. et al. (2004) Die Bewertung von Gründerteams durch Venture-Capital-Geber, Eine empirische Analyse. In: Die Betriebswirtschaft, 2004, 64 (6), pp. 651–670.

Frohn, F. and Arvizu, F. (2012) Verbesserung von Investitionsentscheidungen durch Operational Due Diligence. In: M&A Review, 23 (4), pp. 159–164.

Frommann, H. (2004) BVK Dokumentationen, Private Equity von A bis Z, BVK (ed), Berlin.

Früh, W. (2007) Inhaltsanalyse, 6th edition, UVK publishing, Konstanz.

Geier, M. (2004) Der Wiener Kreis, 4th edition, Rowohlt publishing, Reinbek.

Geyer, A. et al. (2016) Evalution des High-Tech Gründerfonds, Schlussbericht, technopolis group (ed), Vienna.
Available from: https://www.bmwi.de/Redaktion/DE/Downloads/E/evaluation-des-high-tech-gruenderfonds.pdf?__blob=publicationFile&v=6, accessed 9 August 2017.

Godina, B. (2012) Die phänomenologische Methode Husserls für Sozial- und Geisteswissenschaftler, Ebenen und Schritte der phänomenologischen Reduktion, VS publishing, Wiesbaden.

Grethe, C. (2010) Restrukturierung von Krisenunternehmen durch Private Equity-Gesellschaften, Theoretische Grundlagen und empirische Analyse, Dissertation, Technical University Berlin, Berlin.

Grochla, W. (1976) Praxeologische Organisationstheorie durch sachliche und methodische Integration, Eine pragmatische Konzeption. In: Hax, K. (ed) Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung, vol. 28, pp. 617–637.

Häder, M. (2010) Empirische Sozialforschung, 2nd edition, VS publishing, Wiesbaden.

Hanson, W. E. et al. (2005) Mixed Methods Research Designs in Counseling Psychology. In: Journal of Counseling Psychology, 52 (2), pp. 224–235.

Heilemann, U. and Wappler, S. (2010) Spät, widerwillig und wenig – Zu Effizienz und Effektivität der Fiskalischen Konjunkturpolitik in Deutschland 1967–2009. In: Theurl, T. (ed)

Wirtschaftspolitische Konsequenzen der Finanz- und Wirtschaftskrise. Schriften des Vereins für Socialpolitik, vol. 329, Duncker & Humblot publishing, Berlin, pp.127–172.

Helaba (2013) Unternehmensprofil, Helaba (ed), Frankfurt/Main.
Available from: http://www.helaba.de/de/UeberUns/Unternehmensprofil, accessed 9 March 2013.

Helbling, C. (2002a) Besonderheiten der Bewertung von kleinen und mittleren Unternehmen (KMU). In: Peemöller, V. H. (ed) Praxishandbuch der Unternehmensbewertung, 2nd edition, nwb publishing, Herne/Berlin, pp. 187–197.

Helbling, C. (2002b) Absicherungsstrategien gegen Risiken des Unternehmensverkaufs. In: Peemöller, V. H. (ed) Praxishandbuch der Unternehmensbewertung, 2nd edition, nwb publishing, Herne/Berlin, pp. 167–175.

Hellenkamp, D. (2015) Definition of family offices. In: Gabler Wirtschaftslexikon, Gabler publishing (ed), Wiesbaden.
Available from: http://wirtschaftslexikon.gabler.de/Archiv/1097117107/family-office-v3.html, accessed 13 October 2015.

Henrich, G. and Selbherr, G. (2009) Mittelständische Beteiligungsgesellschaften als verlässliche Wegbegleiter Ihrer Partnerunternehmen. In: Option Beteiligungskapital – Chancen für den Mittelstand, BVK (ed), Berlin, pp. 4–7.

High-Tech Gründerfund (2013) Der High-Tech Gründerfonds, HTGF (ed), Bonn.
Available from: http://www.high-tech-gruenderfonds.de/, accessed 7 March 2013.

High-Tech Gründerfund (2017) Startschuss für den High-Tech Gründerfonds III: Starke Partner aus Industrie und Wirtschaft für Start-ups "made in Germany", press release published on 31 May 2017, HTGF (ed), Bonn.
Available from: https://high-tech-gruenderfonds.de/de/startschuss-fuer-den-high-tech-gruenderfonds-iii-starke-partner-aus-industrie-und-wirtschaft-fuer-startups-made-in-germany/, accessed 27 July 2017.

Hoffelner, M. (2010) Verfahren zur Bewertung mittelständischer Unternehmen aus Sicht eines Finanzinvestors, Dissertation, University Leipzig, Leipzig.

Hoffmann, A. and Köhler, E. A. (2010) Ursachen und ordnungspolitische Konsequenzen der Finanzkrise. In: Altmiks, P. (ed) Im Schatten der Finanzkrise, Muss das staatliche Zentralbankwesen abgeschafft werden? Olzog publishing, Munich, pp. 103–134.

Hoffmann, J. (2012) Sprung ins kalte Wasser, Gründer-Know-how vor dem eigenen Start sammeln. In: starting up, 3 (2012).
Available from: http://www.starting-up.de/geschaeftsideen/gruenderstorys/entrepreneur-in-residence.html, accessed, 17 June 2017.

Hommel, U. and Grass, G. (2008) Unternehmensbewertung. In: Picot, G. (ed) Handbuch Mergers & Acquisitions, Planung – Durchführung – Integration, 4th edition, Schäffer-Poeschel publishing, Stuttgart, pp. 374–399.

Huber, W. (2009) Vorwort. In: EKD (2009) Wie ein Riss in hoher Mauer. Wort des Rats der evangelischen Kirche in Deutschland zur globalen Finanzmarkt- und Wirtschaftskrise, EKD (ed), Hannover, pp. 5–6.

Hufnagel, E. (2011) Phänomenologie. In: Reinalter, H. and Brenner, P. J. (eds) Lexikon der Geisteswissenschaften, Böhlau publishing, Vienna, pp. 615–624.

Hummel, D. (2011a) Mittelstands- und Innovationsfinanzierung in Deutschland. Ergebnisse und Hintergründe einer bundesweiten Unternehmensbefragung, University Potsdam, University Publishing Potsdam, Potsdam.

Hummel, D. (2011b) Deutsche Kapitalbeteiligungsgesellschaften im Umfeld der globalen Finanzkrise 2008/2009, University Potsdam, University Publishing Potsdam, Potsdam.

IfM (2014) Gründungen und Unternehmensschließungen, Gründungen und Liquidationen im gewerblichen Bereich, IfM (ed), Bonn.
Available from: http://www.ifm-bonn.org/statistiken/gruendungen-und-unternehmensschliessungen/#accordion=0&tab=0, accessed 22 August 2015.

IfM (2017a) Gewerbliche Existenzgründungen und Liquidationen (Aufgaben), Gewerbliche Existenzgründungen, Liquidationen und deren Saldo 2006 bis 2016 in Deutschland, IfM (ed), Bonn.
Available from: http://www.ifm-bonn.org/fileadmin/data/redaktion/statistik/gruendungen-und-unternehmensschliessungen/dokumente/GewExGr_Li_D_2006-2016.pdf, accessed 13 June 2017.

IfM (2017b) Gewerbliche Nebenerwerbsgründungen und Nebenerwerbsaufgaben, Gewerbliche Nebenerwerbsgründungen, Nebenerwerbsaufgaben und deren Saldo 2006 bis 2016 in Deutschland, IfM (ed), Bonn.
Available from: http://www.ifm-bonn.org/fileadmin/data/redaktion/statistik/gruendungen-und-unternehmensschliessungen/dokumente/GewNebGr_NebAufg_D_2006-2016.pdf, accessed 13 June 2017.

IfM (2017c) Selbständige in den Freien Berufen 1996 bis 2016 in Deutschland – Angaben jeweils zum 01.01. des Jahres in Tsd., IfM (ed), Bonn.
Available from:
http://www.ifm-bonn.org/statistiken/selbststaendigefreie-berufe/#accordion=0&tab=1, accessed 13 June 2017.

IfM (2017d) Insolvenzen und Quote der insolventen Unternehmen in Deutschland (2005–2015), IfM (ed), Bonn.
Available from: http://www.ifm-bonn.org/statistiken/gruendungen-und-unternehmensschliessungen/#accordion=0&tab=5, accessed 13 June 2017.

Innovations-Report.de (2010) KfW Bankengruppe und Commerzbank stellen Eigenkapitalfonds für deutschen Mittelstand vor, IDEA TV (ed), Schmitten.
Available from: http://www.innovations-report.de/html/berichte/wirtschaft-finanzen/kfw-bankengruppe-commerzbank-stellen-156582.html, accessed 4 March 2015.

InvestEurope (2016) The voice of private capital, Venture Capital, Private Equity, Infrastructure, Long Term Investors, EVCA (ed), Brussels.
Available from: http://www.investeurope.eu/research/activity-data/annual-activity-statistics/, accessed 14 October 2016.

Janos, J. and Tracia, R. (2012) Unternehmensbewertung in der Praxis - aktuelle Herausforderungen. In: M&A Review, 23 (4), pp. 165–172.

Jonas, M. (2009) Unternehmensbewertung in der Krise. In: Finanz-Betrieb, 11 (10), pp. 541–546.

Kamin, S. B. and DeMarco, L. P. (2012) How did domestic housing slump turn into a global financial crisis? In: Journal of International Money and Finance, 31 (2012), pp. 10–41.

Kammlott, Christian (2004) Das Kapitalbeteiligungsgeschäft der Sparkassen-Finanzgruppe, Empirische Evidenz für Ziele, Erfolg und Kontrolle, Dissertation, University Witten-Herdecke, Witten-Herdecke.

Kamppeter, W. (2013) Schuldenkrisen, Finanzkrisen und überschießende Liquidität im internationalen Vergleich. In: Kromphardt, J. (ed) Zur aktuellen Finanz-, Wirtschafts- und Schuldenkrise, Schriften der Keynes-Gesellschaft, vol. 6, Metropolis publishing, Marburg, pp. 15–56.

Kanitscheider, B. (2011) Positivismus. In: Reinalter, H. and Brenner, P. J. (eds) Lexikon der Geisteswissenschaften, Böhlau publishing, Vienna, pp. 624–630.

Kaufmann, C. C. (2009) Führung von Minderheitsbeteiligungen in Deutschland, Dissertation, RWTH Aachen, Aachen.

Kempf, W. (2008) Forschungsmethoden der Psychologie, Quantität und Qualität, vol. 2, Regener publishing, Berlin.

Kempf, W. (2009) Forschungsmethoden der Psychologie, Theorie und Empirie, vol. 1, Regener publishing, Berlin.

Keuper, F. and Puchta, D. (2008) Preamble. In: Keuper, F. and Puchta, D. (eds) Strategisches Management in Förderbanken, Gabler publishing, Wiesbaden, pp. XII–XXIV.

KfW (2010) Geschäftsbericht 2009, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc./1_Gesch%C3%A4ftsberichte/Gesch%C3%A4ftsbericht-2009.pdf, accessed 15 January 2015.

KfW (2010a) Förderreport KfW Bankengruppe, Stand: 31.12.2009, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/migration/Weiterleitung-zur-Startseite/Startseite/KfW-Konzern/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/KfW-Foerderstatistik-2009.pdf, accessed 15 January 2015.

KfW (2011) Geschäftsbericht 2010, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc./1_Gesch%C3%A4ftsberichte/GB_2010.pdf, accessed 15 January 2015.

KfW (2011a) Förderreport KfW Bankengruppe, Stand: 31.12.2010, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/migration/Weiterleitung-zur-Startseite/Startseite/KfW-Konzern/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen- Blick/F%C3%B6rderreport/F%C3%B6rderreport-12-2010.pdf, accessed 15 January 2015.

KfW (2012) Geschäftsbericht 2011, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc./1_Gesch%C3%A4ftsberichte/Neu_Geschaeftsbericht_2011.pdf, accessed 15 January 2015.

KfW (2012a) Förderreport KfW Bankengruppe, Stand: 31.12.2011, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/migration/Weiterleitung-zur-Startseite/Startseite/KfW-Konzern/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/F%C3%B6rderreport-12-2011.pdf, accessed 15 January 2015.

KfW (2013) Geschäftsbericht 2012, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc./1_Gesch%C3%A4ftsberichte/Gesch%C3%A4ftsbericht_2012_D.pdf, accessed 15 January 2015.

KfW (2013a) Förderreport KfW Bankengruppe, Stand: 31.12.2012, KfW (ed), Frankfurt/Main. Available from: https://www.kfw.de/migration/Weiterleitung-zur-Startseite/Startseite/KfW-Konzern/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/KfW-F%C3%B6rderreport12-2012.pdf, accessed 15 January 2015.

KfW (2014) Förderreport KfW Bankengruppe, Stand: 31.12.2013, KfW (ed), Frankfurt/Main. Available from: https://www.kfw.de/PDF/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/KfW-F%C3%B6rderreport_09_2013.pdf, accessed 9 August 2017.

KfW (2015) Inlandsförderung, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/inlandsfoerderung/Unternehmen/index-3.html, accessed 8 March 2015.

KfW (2015a) Marshallplan und ERP, Wiederaufbau Deutschland mit finanzieller Hilfe der Alliierten, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/KfW-Konzern/%C3%9Cber-die-KfW/Identit%C3%A4t/Geschichte-der-KfW/Themenfelder/Marshallplan-und-ERP/, accessed 4 March 2015.

KfW (2016) Förderreport KfW Bankengruppe, Stand: 31.12.2015, KfW (ed), Frankfurt/Main. Available from: https://www.kfw.de/PDF/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/KfW-F%C3%B6rderreport_03_2015.pdf, accessed 9 August 2017.

KfW (2017) Förderreport KfW Bankengruppe, Stand: 31.12.2016, KfW (ed), Frankfurt/Main. Available from: https://www.kfw.de/PDF/Unternehmen/Zahlen-und-Fakten/KfW-auf-einen-Blick/F%C3%B6rderreport/KfW-F%C3%B6rderreport_03_2016.pdf, accessed 9 August 2017.

KfW (2017a) KfW stärkt den deutschen Technologiestandort mit neuem Wagniskapital-Produkt, press release published on 19 May 2015, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/KfW-Konzern/Newsroom/Aktuelles/Pressemitteilungen/Pressemitteilungen-Details_274688.html, accessed 27 July 2017.

KfW (2017b) Anfrage zur Beteiligungsfinanzierung, ERP-Startfund and Coparion, unpublished e-mail contact with Dr. Frank Reize, KfW, Product Management, dated 1 August 2017, KfW (ed), Frankfurt/Main.

Kirchhoff, S. et al. (2008) Der Fragebogen, Datenbasis, Konstruktion, Auswertung, 4th edition, VS publishing, Wiesbaden.

Klier, D. O. et al. (2009) The Changing Face of Private Equity: How Modern Private Equity Firms Manage Investment Portfolios. In: The Journal of Private Equity, Fall 2009, pp. 7–13.

Koch, W. (2011) Praktiker-Handbuch Due Diligence. Ganzheitliche Analyse und Bewertung von Unternehmen, 3rd edition, Schäffer-Poeschel publishing, Munich.

Kollmann, T. and Kuckertz, A. (2004) Venture capital decision making after the high-tech downturn: considerations based on German e-business investment cases. In: The Journal of Private Equity, vol. 7, pp. 48–59.

Kranz, P. (2008) Managementunterstützung von mittleren Unternehmen bei Private Equity, Dissertation, HSG, St. Gallen.

Krauß, C. (2015) Cyber-Physical Systems, information brochure, Fraunhofer-Institut für sichere Informationstechnologie (ed), Darmstadt.
Available from: https://www.sit.fraunhofer.de/fileadmin/dokumente/info-material/deutsch/Cyber-Physical-Systems_de_FraunhoferSIT.pdf, accessed 7 December 2015.

Krumnow, J. et al. (2002) Gabler Bank Lexikon, Bank – Börse – Finanzierung, 13th edition, Gabler publishing, Wiesbaden.

Kuckertz, A. (2006) Der Beteiligungsprozess bei Wagniskapitalfinanzierungen, Dissertation, University Duisburg-Essen, Duisburg-Essen.

Kuß, A. (2010) Mixed Method-Designs – Alter Wein in neuen Schläuchen? In: Wrona, T. and Fandel, G. (eds) Journal of Business Economics, 5/2010, pp. 115–125.

Laughlin, R. (1995) Methodological themes, Empirical research in accounting: alternative approaches and a case for middle-range thinking. In: Accounting, Auditing & Accountability Journal, 8 (1), pp. 63–87.

Leece, D. et al. (2012) The post-investment relationship between a Venture Capitalist and its investee companies. In: International Journal of Entrepreneurial Behaviour & Research, 18 (5), pp. 587–602.

Leerhoff, H. et al. (2009) Analytische Philosophie, WBG publishing, Darmstadt.

Leininger, W. and Amann, E. (2007) Einführung in die Spieltheorie, University Dortmund (ed), Dortmund.
Available from: http://www.wiso.tu-dortmund.de/wiso/mik/Medienpool.de/materialien/spiel-theorie_1/spiele1_ws07_08_skript.pdf, accessed 17 August 2013.

Liesen, C. (2010) Empirismus und Positivismus. In: Horster, D. and Jantzen, W. (eds) Wissenschaftstheorie, vol. 1, Kohlhammer publishing, Stuttgart, pp. 300–304.

Lohmann, B. et al. (2014) Kapitalanlagegesetzbuch und Verordnung über Europäische Risikokapitalfonds, Roever Broenner Susat (ed), Frankfurt/Main.
Available from: http://www.rbs-partner.de/fileadmin/Dokumente/Branchen/RBS_Factsheet_PE-VC-Fonds.pdf, accessed 29 October 2014.

Lucks, K. (2001) Management Buy Out. In: Gerke, W. and Steiner, M. (eds) Handwörterbuch des Bank- und Finanzwesens, 3rd edition, Schäffer-Poeschel publishing, Stuttgart, pp. 1518–1526.

Maaß, F. and Führmann, B. (2012) Innovationstätigkeit im Mittelstand – Messung und Bewertung, IfM-Materialien no. 212, IfM (ed), Bonn.

Manchot, P. (2010) Secondary Buyouts: Eine empirische Untersuchung von Werttreibern, Dissertation, European Business School, Oestrich-Winkel.

Mandl, G. and Rabel, K. (2001) Grundlagen der Unternehmensbewertung, Methoden der Unternehmensbewertung. In: Peemöller, V. H. (ed) Praxishandbuch der Unternehmens-bewertung, nwb publishing, Herne and Berlin, pp. 47–85.

Mandl, G. and Rabel, K. (2002) Grundlagen der Unternehmensbewertung, Methoden der Unternehmensbewertung. In: Peemöller, V. H. (ed) Praxishandbuch der Unternehmensbewertung, 2nd edition, nwb publishing, Herne and Berlin, pp. 47–85.

Mankiw, G. and Taylor, M. P. (2012) Grundzüge der Volkswirtschaftslehre, 5th edition, Schäffer-Poeschel publishing, Stuttgart.

Markgraf, D. (2015) Open Innovation. In: Gabler Wirtschaftslexikon, Springer Gabler publishing (ed), Wiesbaden.
Available from: http://wirtschaftslexikon.gabler.de/Archiv/81584/open-innovation-v6.html, accessed 7 December 2015.

Mason, C. and Stark, M. (2004) What do Investors Look for in a Business Plan? In: International Small Business Journal, 22 (3), pp. 227–248.

Matz, C. (2002) Wettbewerbsentwicklung im deutschen Private-Equity-Markt, Strategieoptionen für Beteiligungsgesellschaften, Dissertation, WHU, Koblenz.

Mayring, P. (2010) Qualitative Inhaltsanalyse, Grundlagen und Techniken, 11th edition, Beltz publishing, Weinheim and Basel.

May-Strobl, E. and Haunschild, L. (2013) Der nachhaltige Beschäftigungsbeitrag von KMU, IfM-Materialien no. 206, IfM (ed), Bonn.

Meidl, C. N. (2009) Wissenschaftstheorie für SozialforscherInnen, UTB 3160, Böhlau publishing, Cologne.

Metzger, G. and Bauer, A. (2015) Beteiligungsmarkt in Deutschland – Lücke bei Venture Capital, KfW Research no. 98, dated 16 July 2015, KfW (ed), Frankfurt.
Available from: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-Nr.-98-Juli-2015-VC-in-Deutschland.pdf, accessed 20 June 2017.

Metzger, G. (2016) KfW-Gründungsmonitor 2016, KfW Research, dated June 2016, KfW (ed), Frankfurt/Main.
Available from: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Gr%C3%BCndungsmonitor/Gr%C3%BCndungsmonitor-2016.pdf, accessed 24 October 2016.

Meyding, T. and Grau, T. (2012) M&A unter den aktuellen Marktbedingungen. In: Schalast, C. (ed) M&A Yearbook 2012, Frankfurt School publishing**,** Frankfurt/Main, pp. 3–19.

Miles, M. B. and Huberman, A. M. (1994) Qualitative Data Analysis, An Expanded Sourcebook, 2nd edition, Sage publications, London and New Delhi.
Available from: http://www.vivauniversity.files.worldpress.com/2013/11/milesandhuberman 1994.pdf, accessed 27 September 2014.

Mitchel, F. et al. (1995) Post Investment Demand for Accounting Information by Venture Capitalists. In: Accounting and Business Research, 25 (99), pp. 186–196.

Moon, J. J. (2006) Public vs. Private Equity. In: Journal of Applied Corporate Finance, 18 (3), pp. 76–82.

Müller, M. and Sturm, R. (2010) Wirtschaftspolitik kompakt, VS publishing, Wiesbaden.

Münch, P. A. (2012) Die globale Finanzkrise als Kumulation von Dilemmastrukturen – Plädoyer für eine Ethik mit ökonomischer Methode –, Dissertation, Technical University Munich, Munich.

Mummendey, H.-D. and Grau, I. (2008) Die Fragebogenmethode, 5th edition, Hogrefe publishing, Göttingen.

Nathusius, K. (2001) Grundlagen der Gründungsfinanzierung, Gabler publishing, Wiesbaden.

Natusch, I. (2002) Due Diligence aus der Sicht einer Beteiligungsgesellschaft. In: Berens, W. et al. (eds) Due Diligence bei Unternehmensakquisitionen, 3rd edition, Schäffer-Poeschl publishing, Stuttgart, pp. 535–554.

Neck, R. and Schneider, F. (2013) Wirtschaftspolitik, Oldenbourg publishing, Munich.

Niederöcker, B. (2001) Finanzierungsalternativen in kleinen und mittleren Unternehmen: eine neo-institutionalistische Analyse unter Berücksichtigung der Innovationsfinanzierung, Dissertation, Technical University Ilmenau, Ilmenau.

Optegra (2013) AIFM Regulierungsvorschriften, Optegra GmbH & Co. KG (ed), Cologne. Available from: http://www.aifm.de, accessed 16 July 2013.

Pankotsch, F. (2005) Kapitalbeteiligungsgesellschaften und ihre Portfoliounternehmen, Gestaltungsmöglichkeiten und Erfolgsfaktoren der Zusammenarbeit, Dissertation, Technical University Dresden, Dresden.

Petty, J. S. and Gruber, M. (2011) "In pursuit of the real deal", A longitudinal study of VC decision making. In: Journal of Business Venturing, 26 (2), pp. 172–178.

Pfaffenholz, G. (2004) Exitmanagement, Desinvestitionen von Beteiligungsgesellschaften, Dissertation, University Cologne, Cologne.

Picot, G. (2008a) Das vorvertragliche Verhandlungsstadium bei der Durchführung von Mergers & Acquisitions. In: Picot, G. (ed) Handbuch Mergers & Acquisitions, 4th edition, Schäffer-Poeschl publishing, Stuttgart, pp. 156–205.

Picot, G. (2008b) Vertragliche Gestaltung des Unternehmenskaufs. In: Picot, G. (ed) Handbuch Mergers & Acquisitions, 4th edition, Schäffer-Poeschl publishing, Stuttgart, pp. 206–269.

Plagge, A. (2006) Public Policy for Venture Capital, A Comparison of the United States and Germany, German University publishing, Wiesbaden.

Porst, R. (2009) Der Fragebogen, Ein Arbeitsbuch, 2nd edition, VS publishing, Wiesbaden.

Prorokowski, L. (2013) Lessons from financial crisis contagion simulation in Europe. In: Studies in Economics and Finance, 30 (2), pp. 159–188.

Raithel, J. (2008) Quantitative Forschung, Ein Praxiskurs, 2nd edition, VS publishing, Wiesbaden.

Rajan, R. (2010), Fault Lines, How Hidden Fractures Still Threaten the World Economy, Princeton University Press. In: van Treeck, T. (2012) Did inequality cause the US financial crisis? Working Paper 91, Macroeconomic Policy Institute (ed), Dusseldorf.

Rammer, C. et al. (2005) Innovationsverhalten der deutschen Wirtschaft, Indikatorenbericht zur Innovationserhebung 2004, ZEW (ed), Mannheim.
Available from: http://ftp.zew.de/pub/zew-docs/mip/04/mip_2004.pdf, accessed 26 August 2017.

Rammer, C. et al. (2010) Innovationsverhalten der deutschen Wirtschaft, Indikatorenbericht zur Innovationserhebung 2009, ZEW/infas/Fraunhofer (eds), Mannheim.
Available from: ftp://ftp.zew.de/pub/zew-docs/mip/09/mip_2009.pdf, accessed 1 May 2016.

Rammer, C. et al. (2011) Systemevaluierung „KMU-innovativ“, Abschlussbericht, ZEW/Prognos/ifm (eds), Mannheim and Berlin.
Available from: ftp://ftp.zew.de/pub/zew-docs/gutachten/KMU-innovativ2012.pdf, accessed 15 January 2015.

Rammer, C. et al. (2014) Innovationsverhalten der deutschen Wirtschaft, Indikatorenbericht zur Innovationserhebung 2013, ZEW/infas/Fraunhofer (eds), Mannheim.
Available from: http://ftp.zew.de/pub/zew-docs/mip/13/mip_2013.pdf, accessed 1 May 2016.

Rammer, C. et al. (2016) Innovationsverhalten der deutschen Wirtschaft, Indikatorenbericht zur Innovationserhebung 2015, ZEW/infas/Fraunhofer (eds), Mannheim.
Available from: http://ftp.zew.de/pub/zew-docs/mip/15/mip_2015.pdf, accessed 1 May 2016.

Reißig-Thust, S. (2003) Venture-Capital-Gesellschaften und Gründungsunternehmen, Dissertation, WHU, Vallendar.

Renz, M. (2014a) Gute Neuigkeiten für Venture Capitalisten und Wachstumsunternehmen. In: VentureCapital Magazine: ERP-Startfonds im Fokus, Eine Zwischenbilanz, special edition, p. 3.

Renz, M. (2014b) Interview mit Albrecht Deißner, KfW. In: VentureCapital Magazine: ERP-Startfonds im Fokus, Eine Zwischenbilanz, special edition, pp. 10–11.

Renz, M. (2014c) Interview mit Corinna Monschein, KfW. In: VentureCapital Magazine: ERP-Startfonds im Fokus, Eine Zwischenbilanz, special edition, pp. 22–23.

Röper, B. (2004) Corporate Venture Capital, Eine empirische Untersuchung des Beteiligungsmanagements deutscher und US-amerikanischer Corporate Venture Capital-Investoren, Dissertation, European Business School, Oestrich-Winkel.

Röpke, J. and Stiller, O. (2006) Introduction. In: Schumpeter, J. (1912) Theorie der wirtschaftlichen Entwicklung, Nachdruck der 1. Auflage von 1912, Röpke, J. and Stiller, O. (eds), Duncker & Humblot publishing, Berlin.

Rogall, H. (2013) Volkswirtschaftslehre, Volkswirtschaftslehre III, 29, Vergleich der Wirtschaftspolitik, lecture notes, Berlin, pp. 1/15–10/16.
Available from: http://holger-rogall.de/wp-content/uploads/2014/06/VWL-IV-29-Vergl-Wirtschulen-2015-08-HR-Wiederhergestellt-Kompatibilit%C3%A4tsmodus.pdf, accessed 5 January 2017.

Rudolph, B. (2006) Unternehmensfinanzierung und Kapitalmarkt. In: Richter, R. (ed) Neue ökonomische Grundrisse, Mohr-Siebeck publishing, Tübingen.

Ruffing, R. (2006) Philosophie, UTB basics 2824, Fink publishing, Paderborn.

Sachverständigenrat (2008) Die Finanzkrise meistern – Wachstumskräfte stärken. In: Destatis (ed) Jahresgutachten 2008/2009, Wiesbaden.

Sachverständigenrat (2012) Stabile Architektur für Europa. In: Destatis (ed) Jahresgutachten 2012/2013, Wiesbaden.

Schäfer, D. and Zimmermann, K. F. (2008) Unternehmensfinanzierung – Sind Förderbanken noch zeitgemäß? In: Keuper, F. and Puchta, D. (eds) Strategisches Management in Förderbanken, Gabler publishing, Wiesbaden, pp. 269–294.

Schefczyk, M. (2004) Erfolgsstrategien deutscher Venture Capital-Gesellschaften, 3rd edition, Schäffer-Poeschel publishing, Stuttgart.

Schilder, D. (2006) Public Venture Capital in Germany – Task Force or Forced Task?, Freiberg working papers, Faculty of Economics and Business Administration (ed), Technical University Bergakademie Freiberg, Freiberg.
Available from: http://www.econbiz.de/archiv1/2009/62347_public_venture_capital.pdf, accessed 24 October 2016.

Schmidt, R. H. and Terberger, E. (1997) Grundzüge der Investitions- und Finanzierungstheorie, 4th edition, Gabler publishing, Wiesbaden.

Schneider, G. C. (2003) Verhandlung und Vertragsgestaltung von VC-Investments. In: Kollmann, T. (ed) E-Venture-Management, Gabler publishing, Wiesbaden, pp. 453–466.

Schülein, J. A. and Reitze, S. (2005) Wissenschaftstheorie für Einsteiger, 2nd edition, UTB 2351, Facultas publishing, Vienna.

Schularick, M. (2011) 140 Years of financial crisis: Old Dog, New Tricks. In: Yearbook for economic history, Akademie publishing, Berlin, pp. 45–67.

Schulmeister, S. (2009) Der „Aufbau“ der großen Krise durch „business as usual“ auf Finanzmärkten. In: Chaloupek, G. and Kromphardt, J. (eds) Finanzkrise und Divergenzen in der Wirtschaftsentwicklung als Herausforderung für die Europäische Währungsunion, Schriften der Keynes-Gesellschaft, vol. 3, Metropolis publishing, Marburg, pp. 39–74.

Schumpeter, J. (1985) Aufsätze zur Wirtschaftspolitik, Stolper, W. and Seidl, C. (eds), Mohr Siebeck publishing, Tübingen.

Schumpeter, J. (1987) Theorie der wirtschaftlichen Entwicklung, unveränderter Nachdruck der 1934 erschienenen 4. Auflage, 7th edition, Duncker & Humblot publishing, Berlin.

Selbherr, G. and Steffen, G.-R. (2010) Mittelständische Beteiligungsgesellschaften zuverlässige Partner auch in Krisenzeiten, BVK (ed), Berlin.

Serfling, K. (2009) Konsequenzen der Finanzmarktkrise. In: Nagel, R. and Serfling, K. (eds) Banken, Performance und Finanzmärkte, Festschrift für Karl Scheidl zum 80. Geburtstag, Knapp publishing, Frankfurt/Main, pp. 3–24.

Silkenbeumer, M. (2010) Qualitative und quantitative Methoden. In: Horster, D. and Jantzen, W. (eds) Wissenschaftstheorie, vol. 1, Kohlhammer publishing, Stuttgart, pp. 261–274.

Simon, J. (2009) Der Wert von Beteiligungsverträgen, Abbildung von Vertragsbestandteilen aus Venture-Capital Verträgen in Bewertungsmodellen, Dissertation, European University Viadrina, Frankfurt/Oder.

Sobczak, C. U. (2007) Nicht-finanzielle Unterstützung von PE-Gesellschaften und der Erfolg von Buyouts, Dissertation, RWTH, Aachen.

Söllner, R. (2011) Ausgewählte Ergebnisse für kleine und mittlere Unternehmen in Deutschland 2009. In: Destatis (ed) Wirtschaft und Statistik, Unternehmen und Arbeitsstätten, Wiesbaden, pp. 1086–1096.

Stahl, E. (2003) Aussagekraft und Signalwirkung von Businessplänen. In: Kollmann, T. (ed) E-Venture-Management, Gabler publishing, Wiesbaden, pp. 201–212.

Statista (2015) Börsengänge in Deutschland seit 2000, Statista GmbH (ed), Hamburg.
Available from: http://de.statista.com/statistik/daten/studie/152876/umfrage/boersengaenge-in-deutschland-seit-2000/, accessed 18 August 2015.

Statista (2017a) Anzahl der Börsengänge in Deutschland von 1990 bis 2016, Statista GmbH (ed), Hamburg.
Available from: https://de.statista.com/statistik/daten/studie/152876/umfrage/boersengaenge-in-deutschland-seit-2000/, accessed 20 June 2017.

Statista (2017b) Zahl der direkten Aktionäre in Deutschland von 1996 bis 2016 (in Millionen), Statista GmbH (ed), Hamburg.
Available from: https://de.statista.com/statistik/daten/studie/75227/umfrage/zahl-der-direkten-aktionaere-in-deutschland/, accessed 20 June 2017.

Stefanovic, M. (2009) Wirkungsweise und Bedeutung des Bürgschaftsbankensystems. In: Nagel, R. and Serfling, K. (eds) Banken, Performance und Finanzmärkte, Festschrift für Karl Scheidl zum 80. Geburtstag, Knapp publishing, Frankfurt/Main, pp. 269–286.

Sternberg et al. (2016) Global Entrepreneurship Monitor, Unternehmensgründungen im weltweiten Vergleich, Länderbericht Deutschland 2015, Global Entrepreneurship Research Association (ed), Hannover and Nuremberg.
Available from: https://www.wigeo.uni-hannover.de/fileadmin/wigeo/Geographie/Forschung/Wirtschaftsgeographie/Forschungsprojekte/laufende/GEM_2015/gem2015.pdf, accessed 23 June 2017.

Stocker, F. (2009) Zahltag: Finanz- und Wirtschaftskrise und ökonomische Prinzipien, Facultas publishing, Vienna.

Suman, S. et al. (2012) A Review of Research Methodologies in Private Equity: 2005–2011. In: The Journal of Private Equity, Summer 2012, pp. 33–44.

Thum, O. et al. (2008) Private Equity, Leitfaden zur erfolgreichen Unternehmensfinanzierung, Franz Vahlen publishing, Munich.

Treeck van, T. (2012) Did inequality cause the US financial crisis? Working Paper 91, Macroeconomic Policy Institute (ed), Dusseldorf.

Tyebjee, T. and Bruno, A. V. (1984) A model of venture capitalist investment activity. In: Management Science, 30 (9), pp. 1051–1066.

Tykvová, T. (2004) Who are the True Venture Capitalists in Germany?, ZEW discussion paper, no. 04-16, ZEW (ed), Mannheim.
Available from: http://www.econbiz.de/Record/who-are-the-true-venture-capitalists-in-germany-tykvov%C3%A1-tereza/10001906442, accessed 24 October 2016.

Ueberschär, H. (2007) Haushalte ohne Kontrolle, Förderbanken des Bundes: Nebenhaushalte in der Finanzverfassung, Tectum publishing, Marburg.

Ulrich, H. (1981) Die Betriebswirtschaftslehre als anwendungsorientierte Sozialwissenschaft. In: Geist, M. N. and Köhler, R. (eds) Die Führung des Betriebes, Poeschel publishing, Stuttgart, pp. 1–26.

Vater, D. (2002) Die Qualität deutscher Private Equity-Unternehmen, Optimierungs-möglichkeiten bei der Vergabe von Beteiligungskapital, Dissertation, Technical University Chemnitz, Chemnitz.

VDB (2013) Bürgschaften für Klein- und Mittelbetriebe, Die deutschen Bürgschaftsbanken, VDB (ed), Berlin.
Available from: http://www.vdb-info.de, accessed 9 March 2013.

VOEB (2012) Landesbanken in Deutschland – Beschäftigte, Bilanzsumme und Anteilseigner, VOEB (ed), Berlin.
Available from: http://www.voeb.de, accessed 9 March 2013.

VOEB (2013) Unterwegs im öffentlichen Auftrag, Förderbanken in Deutschland, VOEB (ed), Berlin.
Available from: http://www.voeb.de, accessed 9 November 2014.

VOEB (2014) Fördern und Finanzieren, Förderbanken in Deutschland, Eigenkapital stärken, VOEB (ed), Berlin.
Available from: http://www.voeb.de, accessed 11 November 2014.

Wahrenberger, M. (2011) Parenting advantage im Private Equity, Eine empirische Untersuchung von europäischen Private-Equity-Gesellschaften, Dissertation, University Nuremberg, Nuremberg.

Walach, H. (2009) Psychologie - Wissenschaftstheorie, philosophische Grundlagen und Geschichte: ein Lehrbuch, 2nd edition, Kohlhammer publishing, Stuttgart.

Weber, M. (2008) Förderbanken – Subsidiarität als Leitbild. In: Keuper, F. and Puchta, D. (eds) Strategisches Management in Förderbanken, Gabler publishing, Wiesbaden, pp. 383–401.

Weiland, C. (2008) Risikogerechte Konditionen im Förderkreditbereich. In: Keuper, F. and Puchta, D. (eds) Strategisches Management in Förderbanken, Gabler publishing, Wiesbaden, pp. 179–196.

Welsch, J. (2005) Innovationspolitik, Eine problemorientierte Einführung, GWV publishing, Wiesbaden.

Welter, F. (2015) Gründerschwund, Aktueller Standpunkt des IfM Bonn zum derzeitigen Gründungsgeschehen, IfM (ed), Bonn.
Available from: http://www.ifm-bonn.org/fileadmin/data/redaktion/ueber_uns/ifm-standpunkte/IfM-Standpunkt%2013_Aktuelles_Gruendungsgeschehen.pdf, accessed 22 August 2015.

Wexlberger, C. V. (2011) Management-Unterstützung durch Private Equity-Investoren, Eine vergleichende Untersuchung für Gründungs-, Wachstums- und etablierte Unternehmen, Dissertation, University Rostock, Rostock.

Wildmann, L. (2012) Wirtschaftspolitik, Module der Volkswirtschaftslehre, vol. 3, 2nd edition, Oldenbourg publishing, Munich.

Williamson, O. E. (1975) Markets, Hierarchies and the modern Corporation. In: Journal of Economic Behaviour and Organization, vol. 17, pp. 335–352.

Wohltmann, H.-W. (2016) Monetarismus. In: Gabler Wirtschaftslexikon, Springer Gabler publishing (ed), Wiesbaden.
Available from: http://wirtschaftslexikon.gabler.de/Definition/monetarismus.html, accessed 29 April 2016.

Wrona, T. and Fandel, G. (2010) Möglichkeiten und Grenzen einer Methodeninterpretation. In: Wrona, T. and Fandel, G. (eds) Journal of Business Economics, 04/2010, pp. 1–15.

Zahavi, D. (2009) Husserls Phänomenologie, UTB 3239, Mohr Siebeck publishing, Tübingen.

Zimmermann, V. and Fischer, J. (2003) Beteiligungskapital in Deutschland: Anbieterstrukturen, Verhaltensmuster, Marktlücken und Förderbedarf, KfW (ed), Frankfurt/Main.

Zwenger, T. (2003) Transzendentalphilosophie. In: Rehfus, W. D. (ed) Handwörterbuch Philosophie, Vandenhoeck & Ruprecht publishing, Göttingen.
Available from: http://www.philosophie-woerterbuch.de, accessed 20 May 2014.

Zwirner, C. and Reinholdt, A. (2009a) Auswirkungen der Finanz(markt)krise auf die Unternehmensbewertung. In: IRZ Zeitschrift für Internationale Rechnungslegung, 4 (4), pp.139–141.

Zwirner, C. and Reinholdt, A. (2009b) Unternehmensbewertung im Zeichen der Finanz-marktkrise vor dem Hintergrund der neuen erbschaftssteuerlichen Regelungen – Anmerkungen zu einer angemessenen Zinssatzermittlung. In: Finanz-Betrieb, 11 (7/8), pp. 389–393.

Appendix A: The glossary

AIFM-directive: The Alternative Investment Fund Manager directive, which was first introduced in 2009, is concerned with the regulation and supervision of alternative investment funds. The directive is not focused on the fund but instead regulates the legal framework behind the fund structure. The fund management is obliged to structure the fund management accordingly and to implement a risk management system. If necessary, the risk management system has to be adjusted and the fund's investments must be subject to regular stress tests. Additional obligations are associated with the introduction of a cash-management system for debt financed funds and minimum equity requirements for the fund management (Optegra 2013).

Asset Backed Securities: Banks credit portfolios are bundled and finally sold over the capital market to private and institutional investors. Therefore, special purpose vehicles are founded in order to transform the credit portfolio from the bank. The ABS, which are bundled in the SPVs, are finally sold over the market. By selling the credit portfolio to the SPV, banks receive liquid assets, improve their equity ratio and reduce credit risks in their balance sheets. Thus, banks are able to finance new credit portfolios (Serfling 2009).

Basel I – III: In 1975, the Basel Committee on Banking Supervision was established at the Bank for International Settlements in Basel/Switzerland. The committee agreed on particular equity regulations for banks in relation to their credit volume. The first agreement Basel I was introduced in 1988, and since then banks were obliged to save 8% of their credit volume as liable funds for possible default risks. There was no differentiation with respect to individual credit standings of the borrowers. In 2007, the committee agreed on the new regulation Basel II. Although, the proportion of 8% for liable funds was still valid, banks were obliged to consider the default probability of each borrower. Thus, the amounts of liable funds differ due to the different default probabilities of the borrowers (EFH ns). In January 2013, Basel II was replaced by Basel III. This latest agreement obliged banks to increase their liable funds incrementally to 10.5% until the year 2019. An additional capital conservation buffer must be introduced by banks in 2016 at the latest. The buffer in the proportion of finally 2.5% is introduced to compensate for possible losses during future economic downturns. Finally, a so-called counter-cyclical buffer in the proportion of up to 2.5%, which depends on national circumstances, has to be introduced too. This latter measure should protect the banking sector from excessive credit growth (BIS 2010).

Bretton-Woods: The agreement of Bretton-Woods was signed in 1944 as the institutional framework behind the system of fixed exchange rates. The agreement guaranteed the free conversion of currencies between the member countries. The currencies were allowed to vary by 1% from their fixed value and the central banks were obliged to intervene at the range boarders in order to fix the currencies again. In the case of economic imbalances between the member states, it was possible to devalue or revalue the individual currency in a range of 10%. In 1973, the agreement finally failed due to several crises and the abolition of the US-Dollar gold link (Bartling and Lucius 1993).

Business angel: Private investor who is directly investing in start-ups or established enterprises (Frommann 2004).

Capital-Asset-Pricing-Model: The weighted-average-cost-of-capital requires both the calculation of debt capital costs r(FK) and investor's return expectations $r(EK)_v$. These return expectations are calculated by the so-called CAPM. The model takes a capital market perspective and is based on the equation:

$$r(EK)_v = i_r + z = i_r + \beta \cdot [\mu(r_m) - i_r].$$

The risk premium z by definition is the sum of safe investments expressed by i_r and the factor of systematic risks expressed by β and the market risk premiums expressed by $\mu(r_m) - i_r$. Market risk premiums are the difference between stock market returns expressed by $\mu(r_m)$ and safe investment returns expressed by i_r. The so-called **beta-factor** expresses both systematic risks in the business model and financial risks. The financial risks are derived from the capital structure of the enterprise and the debt ratio. An increasing debt ratio is associated with increased investor return expectations and vice versa (Mandl and Rabel 2002). The beta-factor on average is one. Values above one are associated with increased investment risks and values below one are associated with smaller investment risks (Hommel and Grass 2008).

Cash-flow: The cash-flow expresses the self-financing ability and future profitability of enterprises. This ratio is required in order to calculate the real financial flow which could be distorted due to the application of different balance sheet methods. Different types of depreciation and reserve valuation methods could falsify the results (Baetge et al. 2001).

Cloud Computing: Stands for the flexible provision of IT resources and services over the internet. Enterprises are able to reduce their expenses for IT structures due to the demand-oriented use of cloud computing (Fehling and Leymann 2015).

Community development venture capital: Type of venture capital which is issued on the regional level in order to stimulate entrepreneurship and business growth (Achleitner et al. 2008).

Control premium and minority discount: In order to compensate for the information asymmetries between majority and minority investors, each equity proportion is valued separately and thus is resulting in different amounts. Control premium and minority discounts could be considered irrespective of the specific valuation procedure. The total value of the firm is not influenced by the application of control premium and minority discounts because of their mutual compensation (Natusch 2002).

Cooperative bank: The business model of cooperative banks is based on a German law, the so-called Genossenschaftsgesetz. In their beginning, these banks operated as self-helping institution for their members, the so-called comrades. Nowadays, cooperative banks are classified as universal banks with a clear profit orientation (Ueberschär 2007).

Corporate Venture Capital: This type of VC and PE refers to equity financing measures from corporations which attempt to realise additional returns or try to achieve the access to innovations. Therefore, they maintain separate divisions or daughter companies for equity investments (Krumnow et al. 2002).

Critical rationalism: The basis of critical rationalism is associated with the work of Karl Popper. This scientific approach is based on the possibility of error and incompleteness in the epistemological process. The knowledge progress is regarded as an ongoing process which is associated with the assumption that all-encompassing knowledge is not accessible. Rationalist researchers contradict every type of inductive reasoning to develop theories. On the contrary, critical rationalism is based on deductive reasoning to falsify existing theories as they are always called into question (Engler 2010).

Cyber-Physical Systems: Describe the connection of information technologies with the physical world. CPS are applied in areas such as the automotive, the energy or the health care sector. IT systems which are embedded in specific products or processes are combined to exchange information among themselves and with external resources. Cyber-Physical Systems enable additional functions or improve processes which would not be possible in isolation (Krauß 2015).

Deficit spending: Credit financed public consumption in order to stabilise the economy during recessions (Eggert and Minter 2016).

Demand-oriented innovation policy: This type of innovation policy is concerned with the identification of future demand areas. In order to avoid resources constraints in the future or to satisfy possible demand areas due to the demographic change, the public innovation policy is focused on the support of such demand areas (Welsch 2005).

Diffusion-oriented innovation policy: This type of innovation policy is concerned with the diffusion of new technologies in as much different industry branches as possible. The focus is on the support of SMEs to stimulate their research efforts and to preserve their employment contribution. The strategy is overall focused on the efficient application of the knowledge base to resolve both economic and social problems rather than increasing the entire knowledge base (Welsch 2005).

Discounted Cash-Flow: In comparison to the earnings value method, which is concerned with discounting future earnings, the DCF method is discounting future cash-flows (Hommel and Grass 2008). The advantage of the DCF-method is the capital market view even though the application for the valuation of SMEs and non-listed enterprises has its difficulties (Behringer 2009).

Earn-out approach: In the case of an earn-out agreement between the company owner and the successor, the purchase price of the enterprise is based on a fixed and additional profit-dependent payments in future. The earn-out approach is based on the assumption of instable future developments regarding the enterprise, the specific industry branch and the economy. The period of future instalments is running over three to five years after signing the contract. Therefore, the earlier company owner partly participates on future risks. Hence, the earn-out approach partly

compensates for the information advantage of the company owner and the investment risk of the investor (Helbling 2002b). The development of profits in the future is prone to manipulation. As a result, the previous owner obtains control rights during the earn-out period (Behringer 2009).

Earnings value method: In that case, the firm value is calculated by discounting future enterprise earnings. This valuation method also considers the present value of liquidation results from unnecessary assets. The discount rate is composed of the base rate, the risk premium, the trade tax rate, and the growth and inflation discount respectively. Base rates are calculated on the basis of future public loan returns. Risk premiums are calculated to compensate uncertainties regarding firm's earnings and thus compensate companies operational, market and financial risks (Mandl and Rabel 2001).

Economic policy: A **supply-oriented** economic policy is focused on the reduction of public expenses, of employment costs, of public social payments, of public employment and also concerned with a more flexible employment policy. Moreover, this type of economic policy follows the path of less bureaucracy to relieve the private economy and to allow for additional privately financed investments. Overall, governmental and public actors are more restrained. A **demand-oriented** economic policy on the other hand is associated with a stronger public involvement in order to stabilise and to support the economy's development. In that respect, the economic policy is characterised from public financed investment programmes to stabilise the economy during economic downturns. Such programmes could be financed by additional public borrowing, as the additional credits will be repaid during economic upturns and additional tax income. This procedure is defined as the so-called deficit spending. A demand-oriented economic policy is also associated with tax reliefs for the lower and middle income classes in order to improve their purchasing power. In addition, this type of economic policy is also associated with the expansion of social transfer payments, an active governmental employment policy and the payment of investment subsidies to stimulate investments of the private economy (Rogall 2013).

Eigenkapitalfund for Germany: The fund was launched in cooperation between the KfW and a private bank in Germany in 2010 with a final fund volume of 500 million euros. The fund is focused on equity investments between ten and 30 million euros per deal and in enterprises with annual turnovers of maximum 500 million euros (Innovations-Report.de 2010).

Empiricism: This paradigm bases the epistemological process on impressions and every kind of knowledge is based on these impressions. Human senses capture data for the epistemological process by observation and experiments (Leerhoff et al. 2009). From an empirical researcher's point of view, good sense and mind alone are unable to produce knowledge (Liesen 2010). Therefore, knowledge is based on impressions, impression related thoughts or the interpretations of impressions and thoughts (Leerhoff et al. 2009).

European Angels Fund: The fund was launched in 2012 to boost business angels investments. The fund in the volume of 60 million euros participates on business angels investments to equal conditions. Investment amounts vary between 250,000 euros and five million euros per investment (Foerderdatenbank.de 2015).

European Investment Fund: Investment vehicle of the European Union to support the financing of SMEs, innovations and the technology transfer. Equity, debt and mezzanine products of the EIF are provided by intermediaries in the whole of Europe (EIF 2015).

European Recovery Programme: The so-called ERP was launched after the Second World War in order to rebuild Germany's economy. The repayment of the programme was financed by the federal budget which means that the backflow of the earlier ERP investments was preserved in a separate fund. This separated funding in the so-called ERP-Sondervermögen conserved the funds for future investments. The volume of the ERP-Sondervermögen increased significantly during the post-war periods and made it possible to launch additional funding programmes, inter alia, for regional development, small and medium-sized enterprises or for environmental protection (KfW 2015a).

Family office: The so-called family offices are busy with the management of assets from high net worth individuals (Hellenkamp 2015).

Federal Reserve Board: Central bank system in the US (Krumnow et al. 2002).

Federal State Bank: Eight so-called Landesbanken are located in different federal states of Germany. Shareholders are federal states, larger cities and different savings bank federations (VOEB 2012). The Landesbanken are classified as universal banks and embedded in Germany's savings bank system. The federal state banks are operating worldwide (Helaba 2013).

Federal State Guarantee Bank: 17 different guarantee banks are operating in each federal state of Germany. This number of federal state guarantee banks includes the two institutions which are located in Bavaria. Their business is focused on the federal state of their location and limited to guarantees of maximum 1.25 million euros per case. They are classified as self-helping institutions for the small and medium-sized enterprises. Typically, their shareholders are chambers of commerce, savings and cooperative banks, private banks and economic federations in the region of their location. They provide guarantees for investments of SMEs and for the equity investments of the MBGs (VDB 2013).

Free cash-flow: The free cash-flow is the total cash surplus of the enterprise (Mandl and Rabel 2002).

Fundraising: Fundraising is the process of collecting investment capital from both private and institutional investors (Frommann 2004).

Gross Domestic Product: The GDP expresses the total value of goods and services which are produced within one period and one geographic region. The output of the economy is valued on the basis of the market prices for goods and services (Dornbusch et al. 2008). Nevertheless, the GDP as a measure of welfare does not consider particular services such as childhood care or voluntary services (Mankiw and Taylor 2012).

Gross value added: The term expresses the total value of goods and services of one production process reduced by the value of goods and services which are processed within this production process. Thus, the value of the production process is reduced by the preliminary work (Söllner 2011).

Hands-off: The PE and VC firms are just occasionally involved in their portfolio companies (Frommann 2004).

Hands-on management on the contrary describes the active and regular involvement of the PE and VC investor (Frommann 2004).

Hermeneutic circle: The hermeneutic circle describes a particular method of text interpretation which assumes that thorough text understanding requires in-depth text analysis. Due to the

process of the hermeneutic circle, text interpretation should result in more findings as initially assumed. This requires an ongoing analysis process by considering specific text contents in the light of the whole text and the external research context. This mutual process of text interpretation is defined as the hermeneutic circle (Kempf 2009). In the context of the present thesis, the hermeneutic circle might be applied as described in figure 11 (see appendix K).

High-Tech Gründerfund: Public private partnership in Germany for seed investments. The first fund was introduced in 2005 by the federal department for economic affairs and energy, the Kreditanstalt für Wiederaufbau, and several multinational groups in Germany. A second fund was launched in 2011. In a first financing round, the fund is investing up to 500,000 euros and reserves additional 1.5 million euros for a second financing round. Side investors are invited and the consideration of public support programmes is also possible (High-Tech Gründerfund 2013).

Immanent: The term specifies that particular boarders of definitions are not exceeded. For instance, immanent text interpretation is solely concerned with the text content and does not consider additional external information. According to Kant, immanent is everything that is realised within possible experiences in the type of opinion and thinking. The opposite term of immanent is transcendent (Blume 2003).

Imperfect capital market: On the one hand, weak imperfect markets are classified as the so-called limited capital markets. In that case, interest rates for savings are smaller than interest rates for credits and loans. This difference might be regarded as bank costs. Capital rationing on the other hand is an extreme type of market's imperfectness. In this case, the credit capability of the market participants is limited to a specific amount. This limitation is associated with a fixed interest rate. A weak type of capital rationing refers to increasing financing costs in relation to the capital demand (Schmidt and Terberger 1997).

Induction: Science theory distinguishes between individual and general statements. The latter are regarded as the scientific aim in order to describe regularities in reality. Individual statements are limited, whereas general statements are overall valid. According to empiricism, singular events are generalised by the principle of induction. Popper criticised that it is neither possible to generalise singular events nor to prove their evidence by simple inductive reasoning. He pointed out that the process of induction lacks logic. Therefore, induction is rather considered as an exploratory approach for theory building than as a scientific approach for theory testing. Popper

argued that generalisations which are based on induction must be further tested by deductive reasoning (Chmielewicz 1979). The deductive model of explanation is concerned with the causes behind a particular effect. This deductive model is based on Newton's conclusions regarding mechanics which explains movement from natural laws and side conditions. Due to the deductive model of explanation it is possible, for instance, to calculate the flying course of a canon ball. The inductive model of explanation on the contrary is based on the assumptions that it is impossible to determine regularities due to the data base. In that case, effects are derived from probability assumptions and the consideration of side effects (Kempf 2009).

Industry 4.0: Industry 4.0 describes more flexible product development and production processes due to the integration of both customers and suppliers. This is encompassed from the development of the so-called **hybrid products** as a combination of products and services. Industry 4.0 is based on the so-called **smart factoring** and **smart production**. Production in that respect is based on robots and cyber-physical systems to ensure self-controlling and communication with the internet and the real world (Bendel 2015).

Innovation-based economies: The study of Sternberg et al. (2016) distinguishes between so-called innovation-based economies, efficiency-based economies and factor-based economies. Innovation-based economies, for example Australia, the US and the UK, realise significant investments in education and research and development. **Efficiency-based economies**, for example China, Croatia and Mexico, are on their way to innovation-based economies. **Factor-based economies'** industry structure is dominated from the primary production sector. Egypt, India or Tunisia for example belong to that group of factor-based economies (Sternberg et al. 2016).

Innovation expenses: The statistic of Rammer et al. (2014) includes expenses for ongoing, for finalised and also for innovation projects which were broken off. Expenses are associated with investments in human resources, staff qualification, intangible assets as patents or other proprietary rights and tangible assets as machinery (Rammer et al. 2014, p. 5).

Innovation intensity: Is the proportion of innovation expenses on revenues (Rammer et al. 2014). The statistic of Rammer et al. (2014) presents the innovation intensity of German enterprises with more than five employees.

Innovation political instruments: These are instruments that align the society and the economy on a desired direction of the innovation process. Instruments which directly intervene in the innovation process by means of subsidisation, standards and prohibitions are classified as hard instruments. Soft instruments on the other hand are associated with dialogues, concepts or interactive learning (Welsch 2005).

Innovation success: The success of product innovations is measured by their contribution on total revenues. The success of process innovations on the other hand is determined by their contribution on cost reductions per unit in the production process. Furthermore, process innovations might result in quality improvements of products and services. This improvement is expressed and measured by additional revenues (Rammer et al. 2014, p. 11–12).

Innovation system: According to the definition of Welsch (2005), an innovation system is an efficient framework for the production of new knowledge. Research and development divisions, universities and research institutions are classified as innovation systems. Schools, federations and investment banks belong to the innovation system too as they support the production of new knowledge (Welsch 2005).

Intentionality: In terms of avoiding both metaphysical assumptions and speculation, phenomenology is concerned with the description and analysis of subjects. The approach concentrates on particular experiences to analyse the awareness process. These experiences are based on a specific awareness by concentrating on a specific subject. This whole awareness process is defined as the so-called intentionality. The process of intentionality is rather concerned with individual processes than with the basic conditions of the awareness process. From a phenomenological point of view, both the subject and the results of the awareness process are regarded as one unit (Zahavi 2009).

Kapitalanlagegesetzbuch: The German version of the AIFM-directive, the so-called Kapitalanlagegesetzbuch came into force in July 2013. According to the KAGB, the fund management requires an official accreditation which depends on a suitable organisational structure, a minimum stock on equity, a risk management system and regular reporting. At the time of KAGB's implementation, the German government also adopted the **European Venture Capital regulation**. Venture capital funds according to this regulation have to be focused on specific investments and may not be credit financed (Lohmann et al. 2014).

Key technologies: Technologies in the area of microelectronics, information and communication, photonic, optoelectronics, biotechnology, genetic engineering, advanced materials and advanced production systems (Welsch 2005).

KMU-innovativ: This research funding programme is issued by the German department for education and research. Beside the funding measures in the high-technology area, which are issued by different federal departments, the programme KMU-innovativ is bundling support measures for SMEs in specific research areas. The programme KMU-innovativ subsidises the total research expenses up to 50% and also supports research cooperation between the sciences and the private economy (Belitz et al. 2012).

Lead investor: In the case of syndicated investments, the lead investor is responsible for the structuring and for the organisation of the syndication. In the normal case, the lead investor pays the major investment stake and is also responsible for the monitoring and the mentoring of the portfolio company (Frommann 2004).

Lead market innovation policy: Lead markets are regional markets with product and/or process applications of international relevance. Enterprises which are based in lead markets have competitive advantages and set standards for future applications in specific areas. A lead market-oriented innovation policy is focused on the support and the development of demand areas. These areas have significant export potential (Welsch 2005).

Letter of Intent: The LoI is a written agreement between the entrepreneur and the PE investor. This agreement depends on the positive evaluation of the investment proposal (Nathusius 2001). Usually, the LoI is concerned with the negotiating parties, the investment target, the basic contract framework, due diligence milestones and confidentiality agreements. The letter of intent expresses the intention on a final investment and therefore determines exclusive negotiations for a limited period (Picot 2008a).

Living dead investment: Röper (2004, p. 167) in that respect explains that: “Venture capital investments which neither realise sufficient profits nor need to be written off are classified as living dead investments”.

Management-Buy-In/Management-Buy-Out: In the case of a MBI, the enterprise takeover is realised by an outside management team and in the case of a MBO by the present management team (Lucks 2001).

Marketability discount: Discount on the enterprise value which depends on business line's and market's attractiveness, firm's brand name or exit possibilities (Natusch 2002).

Material-Adverse-Change-Clauses: Are concerned with contract adjustments in the case that important circumstances have changed after the moment of contract signing. Under this perspective, the contract wouldn't have been signed if the circumstances would have been obvious. MAC clauses also allow for contract adjustments in the case that important information were completely missing. In the case of failed contract adjustments due to the application of MAC clauses, contract parties may withdraw from the contract (Picot 2008b).

Mergers & Acquisition: Basic term for enterprise transactions which are associated with enterprise purchases, enterprise sales and the integration of portfolio companies. Furthermore, the term stands for consultancy services in the field of enterprise transactions (Krumnow et al. 2002).

Mezzanine financing: Financing measure in a type of a loan that does not require securities and is therefore positioned between equity and secured loans. This so-called hybrid financing is based on fixed interest rates and sometimes also on the so-called equity kickers. Regarding the latter, the mezzanine capital investor benefits from the increase of enterprise's value and hence performance (Krumnow et al. 2002). Mezzanine capital strengthens the equity basis even though classified as outside capital according to German tax law. Therefore, paid interests are treated as expenditures and reduces the tax amount. On the other hand, mezzanine financing is regarded as equity out of bank's perspective and therefore improves the credit standing (Bankenverband 2005).

Mezzanine Fund for Germany: The fund was launched in 2013, in cooperation between the BMWi, the EIF and the federal state investment banks of North Rhine-Westphalia and Bavaria. The fund in the volume of 200 million euros is under EIF's management and focused on mezzanine capital investments in SMEs (BMWi 2013a).

Monetarism: This economic theory assumes that inflation is completely explained by money supply. Monetarists argue that on the short-run an increase of the money supply would have a positive effect on production and employment, whereas in the long-run would cause inflation. Monetarism denies the suitability of deficit spending and is rather focused on price stability as a prerequisite for economy's further development. Since free markets would always move towards equilibrium, free market mechanisms are able to compensate for shocks. Therefore, monetarism postulates low governmental intervention in order to guarantee both flexible markets and price mechanisms. Rather than being concerned with deficit spending, monetarism is focused on a monetary policy with clear money supply targets to ensure economy's progress (Wohltmann 2016).

Multipliers method: Is an enterprise valuation method which in particular is applied for SME valuation purposes. The firm value is calculated by multiplying enterprise's returns, cash-flows or revenues with specific multipliers. These multipliers are derived from comparable prices and past developments (Mandl and Rabel 2001).

Nascent entrepreneur: The step into self-employment is in the decision phase but currently not realised (Sternberg et al. 2016).

Necessity founders: The enterprise founding is realised due to missing employment alternatives (Sternberg et al. 2016).

Open innovation: The product development process considers the opinion of customers in order to improve products and processes (Markgraf 2015).

Opportunity founders: "The enterprise founding is based on a specific business idea." (Metzger 2016, p. 2).

Phenomenological perception: Is defined as a world view within which the sphere is not simply accepted as it is. A particular perception and interpretation of the world is realised by excluding present conclusions behind reality. Phenomenological perception is concerned with the so-called first and second epoch. The first epoch is doing without ontological assumptions and is the self-reflection of phenomenon's awareness. In that respect, the process of intentionality itself is regarded as a research subject which is examined on a second observation level. Different types

of thoughts are based on the analysis and description of awareness processes, namely the initial and the subsequent level of self-reflection. This means that the process of the first epoch is concerned with describing the particular process of intentionality. These descriptions of the intentionality process could be different themselves and therefore result in different interpretations and assumptions regarding the research subject. The second epoch is concerned with the development of a new philosophy to substantiate the world's existence (Godina 2012).

Positive externalities: Mean that an inventor is not able to internalise the profits of an invention completely (Neck and Schneider 2013). Due to spillover effects, foreign enterprises benefit from the research and development effort of the inventor, without any risk and cost contribution (Plagge 2006). Positive externalities in type of an undersupply of research and development might also caused by incomplete property rights (Neck and Schneider 2013).

Prisoner dilemma: Is part of the game theory and tries to explain social interactions. From the theory's point of view, the decision making process in interactions also depends on foreign decisions. Therefore, the theory tries to find solutions in the decision making process under different circumstances. The prisoner dilemma argues that due to information and incentive problems, a cooperation is less successful. Results could be improved if participants would behave cooperative rather than rational. The problem of non-cooperation is described by the prisoner dilemma in which two prisoners are captured. Both prisoners are suspected the same criminal offence. They have the chance to obtain a minor penalty in the case they act in cooperation. Due to the lack of both binding contracts and monitoring institutions, the prisoners are incapable to achieve the best possible solution and hence obtain a larger penalty than in the case of cooperation (Leininger and Amann 2007; Münch 2012).

Product innovators/Process innovators: Enterprises which transfer scientific knowledge in marketable products or processes are classified as product or process innovators. Beside the development of new products or processes, innovators could also be concerned with the introduction of product or process imitations. The introduction of imitations is also part of Germany's innovation statistics (BMBF 2010).

Public Investment Bank: In total, 19 different public investment banks are operating in the German financial market. Two public investment banks, the Kreditanstalt für Wiederaufbau and the Landwirtschaftliche Rentenbank are operating nationwide, whereas the remaining 17 public

investment banks which are located in the federal states of Germany are operating within the region of their home state. Two public investment banks are located in the free-state of Bavaria which explains the number of 17 public investment banks in the federal states. Public investment banks are concerned with supplementing incomplete markets. Therefore, public investments banks are focused on the financing of SMEs, the agriculture sector, the urban development and of both innovation and environmental projects. They offer subsidised credits, guarantees and equity investments and are refinanced over the capital market or by direct state financing. Public investment banks are obliged to cooperate with the private bank sector in a competitive neutral manner (VOEB 2013).

Rationalism: Rationalism assumes that knowledge is based either on good sense or on intellect (Ruffing 2006; Leerhoff et al. 2009). Knowledge according to rationalism is either based on inductive or deductive reasoning and therefore denies conclusions which are based on impressions and experiences. Nevertheless, knowledge that is derived from impressions might stimulate the knowledge process (Liesen 2010).

Savings banks: Savings banks were already established at the end of the 18th century in order to support the poorer society classes. Savings banks are based on federal state laws. Their business focus is limited to the region of their location and the shareholder basis are the county or the city of their regional focus. Nowadays, savings banks are operating as universal banks in direct competition with private bank institutions (Ueberschär 2007).

Silent investment/silent partnership: This type of business partnership does not require partnership assets, trade register entries or publications. Direct investments are based on contracts between the silent investor and the target firm. Even though it is possible to exclude the loss liability of the silent investor, this investor in principle participates on enterprise's profits. According to the German law, the silent partnership is not liable for the debts of the target firm and, moreover, could not go into receivership due to the lack of assets. Silent partnerships are based on cash investments or the transfer of goods and services (Krumnow et al. 2002).

Solvency II: This European regulation sets standards for Europe's insurance companies regarding minimum capital requirements and organisational structures. The regulation already passed the European Parliament in 2009, but was subsequently adjusted due to financial crisis related requirements (Bafin 2014).

Syndication: In order to minimise the investment risk, several investors are financing the investment amount (Frommann 2004).

Transcendental philosophy: Due to the boundaries of knowledge, human beings do only comprehend parts of reality. Transcendence, as the opposite of immanence, therefore tries to overcome the immanent reality of existence. The core thinking behind transcendental reasoning are reality limitations and the step into a transcendent area which is required to understand reality. According to Kant, transcendent knowledge is concerned with the so-called a priori, non-empirical based knowledge. Transcendental knowledge does not immediately describe the subjects but rather tries to clarify the way in which human beings capture reality. According to Kant's epistemology, transcendental reasoning is incapable to define objective knowledge. He pointed out that only objective knowledge could be classified as universal knowledge (Zwenger 2003).

Venture capital investment grant: The programme was launched in May 2013 to boost private investments of both business angels and non-institutional investors in technological enterprises in Germany. Investors receive a non-refundable public grant in the proportion of 20% of the investment amount, which has to be at least 10,000 euros and may not exceed 250,000 euros (Bafa 2014). The government budgeted 150 million for the period 2013 to 2017 (BMWi 2013).

Verification: In the case of empirical research, the validity of statements could be proved by verification or falsification. A logical evidence in that case is not possible. Verification is concerned with the empirical confirmation of theories. A theory according to the principle of verification is regarded as valid in relation to the number of positive empirical observations. Popper criticised that the number of possible confirmations is unlimited and therefore concluded that a confirmation by verification is impossible. Such a procedure would result in an unending regress. Thus, Popper applied an approach of falsification in order to test existing theories. This principle is concerned with the final falsification of present conclusions. Hence, verification is concerned with temporary theories which are regarded as valid until they are finally falsified (Chmielewicz 1979).

Weighted-Average-Cost-of-Capital: The WACC is one method to calculate enterprise values by discounting future cash-flows. This calculation is based on the so-called free cash-flows which represent firm's cash surplus under the assumption of a debt free company. As a result,

this type of cash-flow neither considers debts, interest costs nor their tax contribution. Tax charges are considered without any interest contribution. The free cash-flow solely expresses the cash surpluses which are based on firm's operations without external financing contributions of both investors and creditors. The free cash-flow is discounted by the WACC which also considers the financing structure and the tax contribution of interest expenses (Mandl and Rabel 2002).

Working capital: Is the difference between current assets and current liabilities. A negative working capital might be associated with liquidity constraints as current liabilities are not refinanced by current assets (Brauner and Lescher 2002).

Young entrepreneur: The step into self-employment is not older than three and a half years at research moment (Sternberg et al. 2016).

ZIM: The research funding measures of Germany's department for economic and energy were bundled in the so-called central innovation programme for SMEs. This programme so-called ZIM is not focused on particular technological areas and classified as technology open. The programme subsidises research projects, innovation networks and consulting services in order to transfer research results in economic contributions. The ZIM is a non-refundable subsidy for parts of the research expenses (Belitz et al. 2012).

Appendix B: The SME definition of the European Commission

Definition of the European Commission:

The SME definition of the European Commission							
SME category	Number of employees	+	Yearly turnover in MEUR	or	Balance sheet total in MEUR	+	Shareholder proportion in per cent
Small	< 9		< 2		< 2		< 25
Medium	9 < 49		2 < 10		2 < 10		< 25
Large	49 < 249		10 < 50		10 < 43		< 25

Table 2 The SME definition of the European Commission (EC 2003, pp. 124/36–124/41)

Appendix C: Private equity and venture capital definitions

Private equity: The term stands for equity-financing of non-listed enterprises for a limited period in which PE investors try to increase the value of the portfolio company. **Venture capital** on the other hand refers to equity-financing in the early-stage phase. This encompasses seed and start-up financing. Public equity, the opposite of private equity, is concerned with financing measures over the stock market (Thum et al. 2008). PE and VC firms fulfil several functions. First, they are focused on the best possible investment decision. Second, they are concerned with the diversification and limitation of investors risks. Third, they fulfil a support function in the capital allocation process. Fourth, they are concerned with the lot size transformation between investors and entrepreneurs. Fifth, they transform information during the pre-investment and post-investment phase. Finally, they balance the different investment horizons of investors and entrepreneurs (Schefczyk 2004).

According to PE firm's shareholder structure, the PE and VC market could be classified into independent investors, dependent investors and the so-called promoters. Independent investors receive investment capital from family offices, insurance companies, banks and foundations. Dependent PE firms are daughter companies of banks, insurance companies or industry firms. The group of promoters follow particular investment strategies in order to compensate for market deficits. The MBGs are representing a typical case of promoter on the federal states level (BVK 2009b).

PE in its majority is structured as a limited partnership for approx. ten years and investment periods between five and six years. The PE investment fund is managed by PE professionals, the so-called general partners. Usually, general partners are committed in the fund with a proportion of 1% to 10% of the fund volume. Beside an annual management fee between 1% and 3%, the general partner receives an additional carried interest. This on top payment in the amount of approx. 20% requires a minimum return success. PE investors are strategic investors and represented in the supervisory boards of their portfolio companies (Moon 2006). The aim of the PE and VC investor to increase the value of the portfolio company is associated with four different value levers. The first lever, the so-called operational performance, is associated with improving firm's expansion and returns. The second lever, the so-called financial engineering, is associated with working capital and debt ratio optimisations. The third lever, is associated with external growth contributions due to acquisition and integration. These so-called mergers &

acquisition strategies could result in positive synergy effects due to firms integration. The final lever is the so-called multiple expansion which is based on the principle of cheap purchase and expensive sale (Thum et al. 2008).

The respective financing focus of an investor is derived from the enterprise lifecycle. According to Matz (2002), the enterprise lifecycle is characterised by the phases of conception, founding, market entrance, expansion and consolidation. Early-stage financing is associated with the phases of conception, founding and market entrance. Expansion financing refers to the phase of expansion and later-stage financing to the phase of consolidation. The latter is associated with management-buy-outs, management-buy-ins and turnaround financing (Matz 2002; Natusch 2002). In addition, PE is concerned with the so-called replacement financing for shareholder pay outs. In that case, the shareholder is replaced by the PE investor. Bridge financing supports both the process of IPOs and the improvement of the equity basis. Finally, financing measures for a so-called going private are associated with enterprise's retreat from the stock market (Feldmann et al. 2007).

Appendix D: The business plan, the due diligence and the investment proportions

The business plan, the due diligence and the investment proportions			
Perspective/Year	2001	2004	2007 – 09
Total market in Germany			
Average number of received BPs per investor	490	268	220
Due Diligence proportion from received BPs	20%	16%	21%
Investment proportion	6%	6%	6%
Mittelständische Beteiligungsgesellschaft			
Average number of received BPs per investor	263	202	190
Due Diligence proportion from received BPs	47%	51%	55%
Investment proportion	23%	27%	29%
Early-stage investors			
Average number of received BPs per investor	550	324	335
Due diligence proportion from received BPs	18%	11%	15%
Investment proportion	4%	1%	4%
Later-stage investors			
Average number of received BPs per investor	308	229	160
Due Diligence proportion from received BPs	26%	21%	24%
Investment proportion	10%	10%	9%

Table 17 The business plan, the due diligence and the investment proportions
(derived from Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010)

Appendix E.1: The questionnaire content of the first KfW study

I. Sample members characteristics:
   1. Type of investor (e.g. MBG, VC, CVC).
   2. Investment fund volume (< 15 MEUR, 15 – 40 MEUR, > 40 MEUR).
   3. Financing phase (later-stage, early-stage, universal investor).
   4. Shareholder structures.
   5. Specification of the biggest shareholder
      (e.g. bank, insurance company, industry company, private investor).
   6. Proportion of fundraising resources (e.g. banks, private investors, public sector, others).

II. Investment process and strategy:
   1. Return expectations in per cent classes (4 – 8%, 8 – 12%, 12 – 16%, ... > 28%).
   2. Significance of investors reputation for the acquisition of deals
      (based on investors' networks, track record, technological knowledge, etc.).
   3. Number of received business proposals in 2001.
   4. Proportion of business proposals for detailed analyses and for investments.
   5. Proportion of hands-on investors.
   6. Proportion of investors who apply a rating procedure.
   7. Significance of rating procedures in the phases of screening and monitoring
      (six point scale: very important – not important).
   8. Deal size proportions
      (deal size classes: < 150 TEUR, 150 – 375 TEUR, 375 – 750 TEUR, ... > 50 MEUR).
   9. Investment proportions of financing phases (e.g. seed, start-up, expansion).
   10. Investment proportions of industry sectors (e.g. IT, life science, services).
   11. Loss proportions in per cent classes for 2001 (0 – 5%, 5 – 10%, … > 25%).
   12. Final returns in per cent classes for 2001 (< 0%, 0 – 4%, 4 – 8%, … > 24%).

III. Changes in the investment strategy:
   1. Development of deal sizes between 1999 and 2001 (increase, decrease, unchanged).
   2. Changes in the investment strategy during 1999 and 2001
      (in terms of: financing phases, industry branches, enterprise sizes, regions).

IV. Deficits in the German PE and VC market:
   1. Proportion of investors who see fundamental market gaps.
   2. Proportion of investors who see ongoing market gaps
      (in terms of: industry branches, financing phases, investment amounts, enterprise sizes).

	3.	Specification of investment obstacles (e.g. weak deal flow, fundraising difficulties, lack of exit options).
V.	Public support measures:	
	1.	Proportion of investors who see public funding demand (in terms of: industry branches, financing phases or enterprise sizes).
	2.	Specification of public funding demand (in: specific industry branches, financing phases or enterprise sizes).
	3.	Proportion of investors who applied for public funding between 1999 and 2001.
	4.	Proportion of public funding on the total investment volume of 1999, 2000, 2001.
	5.	Proportion of public funding channels (EU institutions, KfW, other sources in Germany).
	6.	Specification of the selected funding programme.
	7.	Reasons for the application of public funding (e.g. risk-sharing, cost reduction, public co-investment).

Table 19 The questionnaire content of the first KfW study (derived from Zimmermann and Fischer 2003)

Appendix E.2: The questionnaire content of the second KfW study

I. Sample members characteristics:

1. Type of investor (e.g. MBG, VC, CVC).
2. Investment fund volume (<= 25 MEUR, 25 – 100 MEUR, > 100 MEUR).
3. Financing phase (later-stage, early-stage, universal investor).
4. Shareholder structures.
5. Specification of the biggest shareholder
   (e.g. bank, insurance company, industry company, public institutions).
6. Founding year of the sample member.
7. Average number of portfolio companies.
8. Average number of investment professionals and other employees.
9. Investment volume under management per investment professional.

II. Investment process and strategy:

1. Return expectations in per cent classes (4 – 8%, 8 – 12%, … > 28%).
2. Minimum revenue requirements of investment targets
   (no requirement, 0 – 1.5 MEUR, 1.5 – 5 MEUR, … > 50 MEUR).
3. Proportion of fundraising resources
   (e.g. banks, pension funds, private investors, public sector).
4. Significance of investors reputation for the acquisition of deals
   (based on investors' networks, track record, technological knowledge, etc.).
5. Proportion of deal sources
   (e.g. banks, consultants, business plan competitions, investors' network).
6. Investment proportion of each deal source.
7. Proportion of investors who apply a rating procedure.
8. Number of business proposals in 2004.
9. Proportion of business proposals for detailed analyses and for investments.
10. Relevance of review fields in the due diligence process
    (e.g. product and market, exit channel, management team).
11. Type of equity investment (e.g. silent investment, shareholder loan, etc.).
12. Investment proportions of industry sectors (e.g. IT, life science, medical care).
13. Investment proportions of financing phases (e.g. seed, start-up, expansion).
14. Proportion of different deal size classes (> 150 TEUR, 150 – 375 TEUR, … > 50 MEUR).
15. Minimum investment volume per deal in classes (e.g. 150 – 375 TEUR).
16. Standard investment size class per deal (e.g. 150 – 375 TEUR).
17. Average investment amount per deal.

18. Break-off reasons (e.g. no investor realized the deal, price expectations).
19. Syndication proportions (lead, co-lead, co-investor, sole investor).
20. Proportion of hands-on investors.
21. Proportion of exit channels (e.g. IPO, buy-back, total loss).
22. Loss proportions from the fund volume in per cent classes (0 – 5%, 5 – 10%, 10 – 15%, 15 – 25%, > 25%).

III. Changes in the investment strategy:

1. Development of loss proportions between 2003 and 2004 (increase, decrease, unchanged).
2. Development of average deal sizes between 2002 and 2004 (increase, decrease, unchanged).
3. Changes in the investment activity between 2002 and 2004 (in terms of: industry branches, financing phase, type of investment, enterprise sizes).
4. Relevance of mezzanine financing products in the PE and VC market.

IV. Deficits in the German PE and VC market:

1. Proportion of investors who see fundamental market gaps.
2. Proportion of investors who see ongoing market gaps (in terms of: industry branches, financing phases, deal sizes, enterprise sizes).
3. Significance of investment obstacles in the PE and VC market (e.g. weak deal flow, difficulties in fund raising, limited exit options).

V. Public support measures:

1. Proportion of investors who applied at least once for public funding.
2. Public funding proportion from the investment volumes between 2002 and 2004 (each on the level of independent investors and every type of investor).
3. Proportion of public funding channels (e.g. EU institutions, KfW, other sources in Germany).
4. Reasons for the application of public funding (e.g. risk-sharing, cost reduction, public co-investment).

Table 20 The questionnaire content of the second KfW study (derived from Achleitner et al. 2006)

Appendix E.3: The questionnaire content of the third KfW study

I. Sample members characteristics:

1. Type of investor (e.g. MBG, VC, CVC).
2. Investment fund volume (< 25 MEUR, 25 – 100 MEUR, > 100 MEUR).
3. Financing phase (later-stage, early-stage, universal investor).
4. Shareholder structures.
5. Specification of the biggest shareholder
   (e.g. private bank, savings bank, insurance company, industry company).
6. Founding year of the sample member.
7. Average number of portfolio companies.
8. Average number of portfolio companies without MBGs.
9. Average number of investment professionals and other employees.
10. Qualification background of the investment professionals.
11. Professional background of the investment professionals.
12. Investment volume under management per investment professional.

II. Investment strategy and investment process:

1. Return expectations in per cent classes (0 – 10%, 10 – 20%, … > 50%).
2. Revenue requirements of investment targets
   (no requirement, 0 – 1.5 MEUR, 1.5 – 5 MEUR, … > 50 MEUR).
3. Proportion of fundraising resources
   (e.g. private banks, pension funds, private investors, public sector).
4. Proportion of deal sources
   (e.g. banks, consultants, business plan competitions, network).
5. Investment proportion of each deal source.
6. Number of received business proposals.
7. Proportion of business proposals for detailed analyses and for investments.
8. Investment proportions from financing phases (e.g. seed, start-up, expansion).
9. Minimum investment volume per deal in classes (e.g. 150 – 750 TEUR).
10. Average investment amount per deal.
11. Proportion of deal size classes (e.g. 1.5 – 5 MEUR, 5 – 15 MEUR, 15 – 50 MEUR).
12. Equity proportion of the investor in per cent classes (< 25%, 25 – 50%, > 50%).
13. Break-off reasons (e.g. no investor realised the deal, contract clauses).
14. Syndication proportions (lead, co-lead, co-investor, sole investor).
15. Proportion of hands-on investors.
16. Monitoring and mentoring extent (in man-days).

17. Proportion of exit channels (e.g. IPO, buy-back, total loss).

III. Changes in the investment strategy:

1. Development of loss proportions between 2008 and 2009.
2. Development of portfolios net asset value in 2009
   (proportion of investors in per cent classes of NAV's development).
3. Development of the average investment amount per deal between 2008 and 2009
   (increased, decreased, unchanged).
4. Changes in the investment activity between 2007 and 2009
   (in terms of: financing phase, industry branches, enterprise sizes).

IV. Deficits in the German PE and VC market:

1. Proportion of investors who see fundamental market gaps.
2. Proportion of investors who see ongoing market gaps
   (in terms of: industry branches and financing phases).
3. Significance of investment obstacles in the PE and VC market
   (e.g. weak deal flow, exit difficulties, level of valuation multiples).

V. Public support measures:

1. Proportion of investors who applied for public funding between 2007 and 2009.
2. Proportion of public funding on investment volumes between 2007 and 2009.
3. Proportion of public funding channels between 2007 and 2009
   (e.g. EU institutions, KfW, other sources in Germany).
4. Reasons for the application of public funding
   (e.g. risk-sharing, cost reduction, public co-investment).

Table 21 The questionnaire content of the third KfW study (derived from Achleitner et al. 2010)

Appendix F.1: The main study questionnaire

Research project on Germany's Private-Equity market

Part I: This part of the survey is focused on the characteristics of your firm.

1. Please state your firm's ownership structure?

Please choose one item.

- ☐ Independent (diverse shareholder structure)
- ☐ Captive (Corporate Venture Capital firm)
- ☐ MBG (Mittelständische Beteiligungsgesellschaft)
- ☐ Public (shareholders are: Federal States, Universities, Business Development Agencies, public banks)

2. Founding year of your firm?

_____

3. Regional investment focus of your firm.

Please choose one item.

- ☐ Germany
- ☐ Europe (European Community member states)
- ☐ World

4. Number of portfolio companies:

a) in 2012?_____

b) in 2011?_____

c) in 2010?_____

5. Number of investments:

a) in 2012?_____

b) in 2011?_____

c) in 2010?_____

6. Total fund volume in EUR:

Figures in million.

a) in 2012?_____ MEUR

b) in 2011?_____ MEUR

c) in 2010?_____ MEUR

7. Total investment volume in EUR:

Figures in million.

a) in 2012?_____ MEUR

b) in 2011?_____ MEUR

c) in 2010?_____ MEUR

Part II: This part of the survey is focused on your firm's investment strategy.

8. Specify your firm's financing focus.

Multiple selection is possible.

- ☐ Seed
- ☐ Start-up
- ☐ Expansion
- ☐ Bridge & Replacement
- ☐ MBO/MBI
- ☐ Turnaround

9. Specify the sector of industry your firm is focused on.

Multiple selection is possible.

- ☐ Mechanical and plant engineering, industry automation
- ☐ Consumer goods and retail
- ☐ Chemistry
- ☐ Electronics
- ☐ Software/IT
- ☐ Energy/Water/Environment
- ☐ Logistics
- ☐ Pharmacy/Medicine/Biotech
- ☐ Telco/Internet
- ☐ Financial Services
- ☐ Services (including consulting)
- ☐ Other (please specify:_____)

10. State the preferred type of investment.

Multiple selection is possible.

☐ Minority investments

☐ Majority investments

☐ Silent investments

☐ Open investments

11. Did your firm apply for public funding during 2010 – 2012?

	Never	Seldom	Sometimes	Often	Always
On the level of your firm	☐	☐	☐	☐	☐
On the level of your portfolio	☐	☐	☐	☐	☐

12. Specify the total proportion of public funding in relation to the annual investment volume.

a) in 2012:_____ %

b) in 2011:_____ %

c) in 2010:_____ %

13. Please state the proportion of syndicated investments.

Independent if lead or non-lead investments. State the proportion in relation to the total number of investments.

a) in 2012:_____ %

b) in 2011:_____ %

c) in 2010:_____ %

Part III: This part of the survey is focused on your firm's investment process.

14. Annual turnover thresholds of investment targets at the moment of the survey?

Figures in million.

- Minimum yearly turnover:_____MEUR
- Maximum yearly turnover:_____MEUR

15. Specify the development of annual turnover thresholds during 2010 – 2012.

	Decreased	Increased	Unchanged
Minimum yearly turnover	☐	☐	☐
Maximum yearly turnover	☐	☐	☐

16. Standard investment amount per deal at the moment of the survey?

Consider only company's proportion without syndication partner's proportion.

☐	100 – 499 TEUR	☐	5,000 – 14,999 TEUR
☐	500 – 1,500 TEUR	☐	15,000 – 25,000 TEUR
☐	1.501 – 4,999 TEUR	☐	> 25,001 TEUR

17. Please state the development of the standard investment amount per deal during 2010 – 2012.

	Decreased	Increased	Unchanged
Standard investment amount	☐	☐	☐

18. State the number of investment inquiries received.

Consider every type of inquiry if possible: complete business plans, executive summaries, short requests.

a) in 2012:_____

b) in 2011:_____

c) in 2010:_____

19. Specify the proportion of deal sources in per cent.

Year	2012	2011	2010
Bank			
Consultant (incl. Tax, Legal, Audit)			
Auction			
Chamber of commerce/federation			
Personal network			
PE-/VC-firm			
Universities			
Other			
Total	100%	100%	100%

20. Business plan: Please determine the importance of each component at the moment of the survey.

The last section refers to the quality of the business plan.

	Less important				Very important
	1	2	3	4	5
Strategy	☐	☐	☐	☐	☐
Market & Competition	☐	☐	☐	☐	☐
Product & Services	☐	☐	☐	☐	☐
Marketing & Sales	☐	☐	☐	☐	☐
Management team	☐	☐	☐	☐	☐
Human resources	☐	☐	☐	☐	☐
Organisation	☐	☐	☐	☐	☐
Research and development	☐	☐	☐	☐	☐
Financial forecast	☐	☐	☐	☐	☐
Finance & Controlling	☐	☐	☐	☐	☐
Completeness & Coherence	☐	☐	☐	☐	☐

21. Please assess the relevance of business plan's components during 2010 – 2012.

	Decreased	Increased	Unchanged
Strategy	☐	☐	☐
Market & Competition	☐	☐	☐
Product & Services	☐	☐	☐
Marketing & Sales	☐	☐	☐
Management team	☐	☐	☐
Human resources	☐	☐	☐
Organisation	☐	☐	☐
Research and development	☐	☐	☐
Financial forecast	☐	☐	☐
Finance & Controlling	☐	☐	☐
Completeness & Coherence	☐	☐	☐

22. Proportion of business plans finally considered for investments?

a)in 2012:_____%

b)in 2011:_____%

c)in 2010:_____%

23. Due Diligence: Please determine the importance of each component at the moment of the survey.

	Less important				Very important
	1	2	3	4	5
Strategy	☐	☐	☐	☐	☐
Product & Service	☐	☐	☐	☐	☐
Marketing & Sales	☐	☐	☐	☐	☐
Human resources	☐	☐	☐	☐	☐
Finance & Controlling	☐	☐	☐	☐	☐
Organisation	☐	☐	☐	☐	☐
Research & Develop.	☐	☐	☐	☐	☐
Management team	☐	☐	☐	☐	☐

24. Please assess the relevance of due diligence's components during 2010 – 2012.

	Decreased	Increased	Unchanged
Strategy	☐	☐	☐
Product & Service	☐	☐	☐
Marketing & Sales	☐	☐	☐
Human resources	☐	☐	☐
Finance & Controlling	☐	☐	☐
Organisation	☐	☐	☐
Research & Develop.	☐	☐	☐
Management team	☐	☐	☐

25. Specify the proportion of break-off reasons.

Year	2012	2011	2010
Deal finalised by competitor			
No investor realised the deal			
Particular contract rights			
Other			
Total	100%	100%	100%

26. Mentoring: Specify your firm's involvement in the portfolio at the moment of the survey.

	Not involved	Seldom	Sometimes	Often	Always
Strategy definition	☐	☐	☐	☐	☐
Strategy implementation	☐	☐	☐	☐	☐
Procurement & Production	☐	☐	☐	☐	☐
Marketing & Sales	☐	☐	☐	☐	☐
Finance & Controlling	☐	☐	☐	☐	☐
Human resources	☐	☐	☐	☐	☐
Board establishment	☐	☐	☐	☐	☐
Management recruitment	☐	☐	☐	☐	☐
Management coaching	☐	☐	☐	☐	☐

27. Please assess the overall involvement in your portfolio during 2010 – 2012.

	Decreased	Increased	Unchanged
The overall involvement:	☐	☐	☐

28. Specify the proportion of exit channels.

Buy-backs includes repayments for silent investments.

Year	2012	2011	2010
Trade sales			
Secondary purchases			
IPOs			
Buy-backs/Repayment			
Total losses			
Total	100%	100%	100%

Part IV: This part of the survey is focused on Basel III and the AIFM transformation law.

29. Please specify the effects of Basel III in terms of industry branches.

Multiple selection is possible.

- ☐ Our firm is considering additional sectors of industry.
- ☐ Our firm is disregarding particular sectors of industry.
- ☐ Our firm neither considers nor disregards particular sectors.

30. Does the Alternative-Investment-Fund-Manager transformation law (AIFM) has an impact on your firm's investment process?

Multiple selection is possible.

- ☐ Regarding the selection process.
  Please clarify:

- ☐ Regarding the due diligence process.
  Please clarify:

- ☐ Regarding the monitoring process.
  Please clarify:

Last three questions:

31. What is your current position in the firm?

_____

32. How long have you been employed?

_____

Anything else you would like to tell us?

_____

Appendix F.2: The main study instructions

Edinburgh Business School/ Heriot-Watt University
Edinburgh, Scotland, EHI4 4AS

Research project on Germany's Private-Equity market

The subsequent questionnaire is divided into four parts and the completion will take approx. 20 minutes.

Please be so kind and answer each question. In case you should not know the exact answer, please provide an estimation.

A significant participation is essential to receive scientific meaningful results. Therefore, please return the questionnaire even if only partly completed.

Please feel free to process the questionnaire on PC, paper-based or with the online version. Beside the online version link in the e-mail, the MS-Word file of the questionnaire is enclosed.

Please contact Christian Schlamp on (0160) 98458358 or cschlamp@t-online.de for further information regarding this project.

We would kindly ask you to return the questionnaire by e-mail, mail or fax until _____ to following contact address in Germany:

Christian Schlamp
Schwarzwaldstraße 20
D-65232 Taunusstein
E-Mail: cschlamp@t-online.de
Fax: (03222) 1427506

If you want to receive the study results, please convey a contact address.

Thank you very much for your participation.

Appendix G.1: The progress of the private equity market in Europe

The progress of the private equity market in Europe						
Amounts in MEUR	2007	2008	2009	2010	2011	2012
New funds raised[1)]	79,587	80,475	18,914	21,797	41,604	23,608
Number of funds	483	407	315	308	337	239
Number of VC funds	196	165	148	134	152	102
Proportion of VC funds	41%	41%	47%	44%	45%	43%
Total investments[2)]	69,841	53,366	24,308	41,918	44,870	36,459
Total VC investments	6,011	6,309	3,823	3,661	3,695	3,185
Proportion of VC investments	9%	12%	16%	9%	8%	9%
Number of portfolio companies	5,114	5,567	4,762	5,017	4,903	4,975
Number of VC backed portfolio companies	3,339	3,667	3,155	3,039	2,965	2,923
Total divestments in MEUR	26,456	14,081	11,543	19,230	30,329	21,642
Divestment/investment relation	38%	26%	48%	46%	68%	59%
Write-offs in MEUR	727	855	4,063	4,158	3,877	1,887
Write-off/divestment relation	2.7%	6.1%	35.2%	21.6%	12.8%	8.7%

1) Including capital gains.

2) Market statistics (including the investments of investors from outside Europe).

Table 10 The progress of the private equity market in Europe (derived from EVCA 2013)

Appendix G.2: The progress of the private equity market in Germany

The progress of the private equity market in Germany						
Amounts in MEUR	2007	2008	2009	2010	2011	2012
New funds raised[1)]	4,532	2,561	1,191	1,217	3,303	1,859
Number of funds	77	47	23	30	35	25
Number of VC funds	39	29	19	20	21	11
Proportion of VC funds	51%	62%	83%	67%	60%	44%
Total investments[2)]	10,448	9,584	3,024	4,895	6,667	6,455
Total VC investments	817	1,094	659	729	717	549
Proportion of VC investments	8%	11%	22%	15%	11%	9%
Number of portfolio companies	1,105	1,342	1,216	1,359	1,291	1,272
Number of VC backed portfolio companies	864	1,044	929	966	884	768
Total divestments in MEUR	3,984	2,304	1,948	3,237	5,336	3,441
Divestment/investment relation	38%	24%	64%	66%	80%	53%
Write-offs in MEUR	130	137	898	633	954	429
Write-off/divestment relation	3.3%	6.0%	46.1%	19.6%	17.9%	12.5%

1) Including capital gains.

2) Market statistics (including the investments of investors from outside Germany).

Table 11 The progress of the private equity market in Germany (derived from EVCA 2013)

Appendix G.3: The development of Germany's equity market from 1999 to 2009

The development of Germany's equity market from 1999 to 2009			
Timeframe	1999 – 2001	2002 – 2004	2007 – 2009
Average GDP in Germany:	+2.2 %	+0.3 %	./.0.2%
Most important investment sectors:			
a) industry sector/production:	35%	19%	23%
b) IT/telco/media:	32%	27%	24%
c) life science:	18%	18%	12%
Proportion of financing phases from the investment volume:			
a) seed/start-up financing:	43%	34%	31%
b) expansion financing:	38%	39%	31%
c) MBI/MBO financing:	13%	20%	27%
Most important financing phase: (Total market perspective without seed financing. Proportion from the financing volume is indicated in brackets.)	1. Expansion (38%) 2. Start-up (32%) 3. MBO/MBI (13%)	1. Expansion (39%) 2. Start-up (25%) 3. MBO/MBI (20%)	1. Expansion (31%) 2. MBO/MBI (27%) 3. Start-up (23%)
Proportion of investment classes from the number of investments:			
a) < 1.5 MEUR:	53%	59%	46%
b) 1.5 – 5 MEUR:	31%	21%	20%
c) > 50 MEUR:	5%	9%	14%

Proportion of survey participants who expect minimum returns of:			
a) 4% – 20%:	39%	51%	44%
b) > 20%:	61%	49%	56%
Proportion of survey participants who see a market gap in the area of:			
a) seed financing:	71%	74%	71%
b) start-up financing:	53%	55%	84%
c) expansion financing:	20%	17%	42%
d) turnaround financing:	40%	21%	35%
Proportion of survey respondents who see a market gap in deals between:			
a) < 150 TEUR:	54%	55%	-
b) 150 TEUR – 375 TEUR:	61%	62%	-
c) 375 TEUR – 750 TEUR:	34%	45%	-
d) 750 TEUR – 1,500 TEUR:	17%	27%	-

Table 16 The development of Germany's equity market from 1999 to 2009
(derived from Zimmermann and Fischer 2003; Achleitner et al. 2006; Achleitner et al. 2010)

Appendix H: The investment process of private equity and venture capital firms

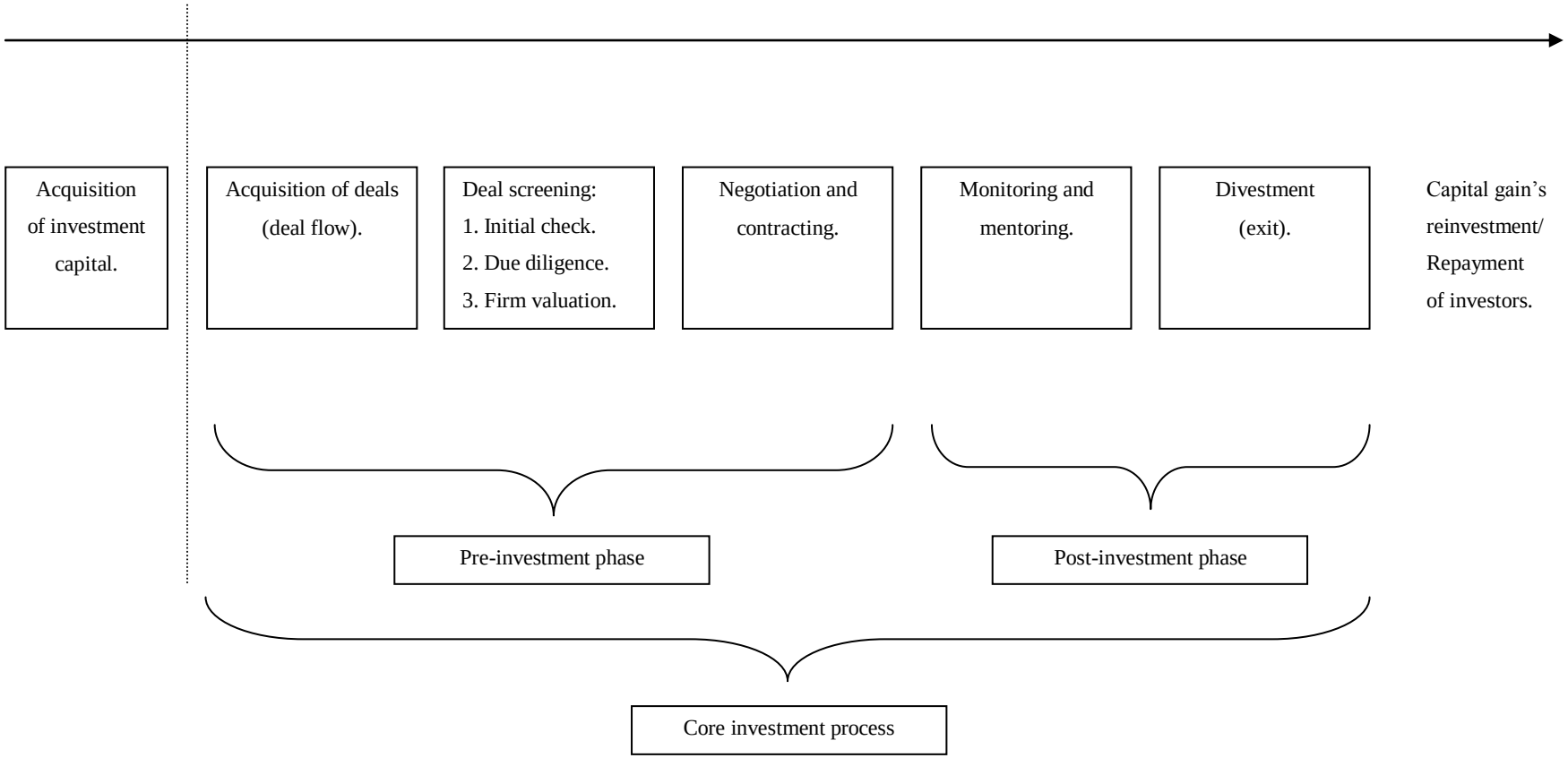
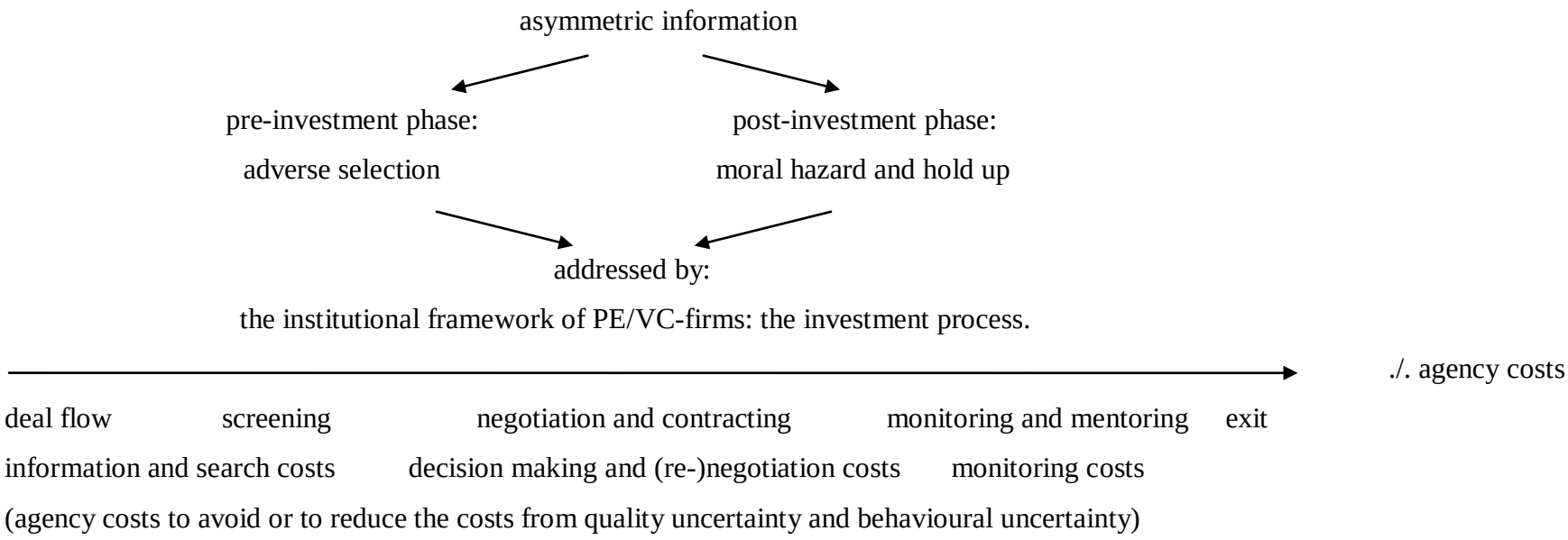


Figure 7 The investment process of private equity and venture capital firms
(derived from Tyebjee and Bruno 1984; Matz 2002; Feldmann et al. 2007)

Appendix I: The application of the neo-institutional financial theory

1. Examination basis: Neo-classical assumption of transactions without information and incentive problems: first-best optimum

2. Institutional focus of the neo-institutional financial theory: What is the most efficient institution/organisation?



3. Examination result: Most efficient institution or organisation for the improvement of the second-best optimum: second-best optimum

Figure 8 The application of the neo-institutional financial theory
(derived from Schmidt and Terberger 1997; Rudolph 2006)

Appendix J.1: The research paradigms

Positivism

In its beginning, positivism was concerned with the development of a standard scientific language and method to integrate the different scientific orientations. Therefore, positivism tried to cope with the separate orientations of empiricism and rationalism by emphasising the advantages of both approaches. These paradigms dominated the philosophical schools in the 17th and the 18th century (Liesen 2010). In the later-stage of the French reconnaissance, Comte criticised philosophy as being inappropriate as a leading knowledge base. He points out that philosophy lacks the connection to reality and ignores mathematical calculations. The metaphysical and all-encompassing thoughts behind philosophy are based on individual assumptions rather than on facts. Furthermore, positivist researchers argued that metaphysics would be unable to substantiate assumptions behind causes of reality. Moreover, they criticised the assumption of a basic reason behind existence. According to positivist reasoning, every assumption regarding reality must be proved by empirical observation. Hence, positivism does without transcendental assumptions to clarify phenomena and is solely concerned with the description of reality (Kanitscheider 2011). In that respect, positivism tries to separate meaningless from meaningful and real from translucent problems. Knowledge, according to a positivist researcher, is based on the combination of experience and logical reasoning. Results could be regarded as logical true or empirical true. Results which are achieved outside these perspectives are disregarded as metaphysical speculation (Liesen 2010). Overall, the objectives of positivism are focused on the elimination of both poetical and literary elements in philosophy. Thus, positivism tries to develop a kind of philosophy that is regarded as a strong scientific approach to deliver verifiable results (Kanitscheider 2011).

The further development of positivism is associated with the so-called Circle of Vienna. These academicians focused on the development of a standard scientific approach (Ruffing 2006). The circle argued that theories regarding the believe in god or immortality are completely meaningless. Hence, questions regarding being and nothing are disregarded as philosophical issues (Geier 2004). The main effort of the circle referred to the development of criteria in order to distinguish between pure sciences and metaphysics (Kanitscheider 2011). Logical positivism postulated the further development of philosophy as the basic underpinning of sciences. Therefore, philosophy has to accept natural sciences and their methods (Leerhoff et al. 2009).

Popper shares the opinion of the Circle of Vienna regarding the importance of logical reasoning and the negation of metaphysical assumptions. However, he criticises that positivism is based on inductive reasoning which would contradict the human recognition process. According to Popper, induction is associated with an infinite process and, therefore, is unsuitable to describe the full reality (Walach 2009). In the case of inductive reasoning, Popper argues that regularities of cause and effect are solely based on individual assumptions rather than on the principle of causality. In addition, he criticises that earlier successful inductive reasoning does not automatically guarantee its successful application in future. Such an assumption would contradict logical reasoning as it would be possible to falsify the positive application of induction in future (Meidl 2009). It is impossible to prove the principle of inductive reasoning by logic as every attempt is resulting in an infinite regress (Engler 2010). Therefore, science according to Popper is a system of temporarily accepted hypotheses rather than a system of finally proved theories (Schülein and Reitze 2005). In the case of inductive reasoning, the empirical observations do not prove evidence of a final conclusion. Hypotheses which are based on inductive reasoning are regarded as quite but not definitely true. In that case, the risk of remaining error always exists (Leerhoff et al. 2009). Hence, a theory according to Popper creates conditions for possible future falsification (Ruffing 2006). Hypotheses are accepted as long as they prove themselves and not under the assumption of their permanent validity (Schülein and Reitze 2005). According to Popper's point of view, one different observation immediately calls an existing theory into question. However, just one different observation is regarded as unsatisfactory for theory's final falsification. Scientific theories should therefore produce different propositions in order to withstand several falsification attempts. A theory could then be regarded as confirmed after several unsuccessful falsification attempts (Leerhoff et al. 2009). This process of hypotheses testing and falsification is resulting in an ongoing knowledge process. A knowledge progress is then realised if new empirical facts are calling existing theories into question or require their further development (Schülein and Reitze 2005).

Critical assumptions regarding positivism

One part of criticism regarding positivist assumptions is associated with the so-called critical theory (Schülein and Reitze 2005). One representative, Horkheimer, argues that positivism follows the aim of controlling both the nature and the humans (Ruffing 2006). It is criticised that positivism claims to be the leading discipline in social sciences without the critical reflection of natural sciences. The supposed value freedom of positivism is called into question due to several

assumptions. First, society's influence regarding the development of sciences. Second, industry sector's influence regarding theory development and their further application. Finally, individual aims behind research and research results. It is argued that positivism does not consider these determinants which would influence the research results. Therefore, the representatives of the critical theory claim the critical reflection of research by observing the relationship between science and society. Adorno and Habermas pointed out that knowledge could not be exclusively based on quantitative methods which would narrow the reflection of reality (Schülein and Reitze 2005). Adorno, Horkheimer and Habermas based their overall reasoning on the interrelatedness of technology, politics and economy which would influence the research process. Out of their point of view, sciences could not claim to be unprejudiced or objective due to economy's power (Walach 2009).

Beside these rather political assumptions, Kuhn criticises Popper's approach of falsification and points out that science is not concerned with the falsification of theories but rather with their clarification and expansion. According to Kuhn, existing theories should be stepwise refined rather than completely falsified (Leerhoff et al. 2009). Feyerabend on the other hand, criticises both positivism and rationalism due to their unquestioned application of systematic approaches. In that respect, he argues that such approaches are inappropriate to solve complex interactions. In order to avoid a simplification of reality, sciences require a dynamic epistemological approach (Schülein and Reitze 2005). Feyerabend argues that sciences are neither based on particular methodological approaches nor on logical reasoning. Therefore, he postulates scientific pluralism to avoid every type of strictness in sciences (Ruffing 2006). Feyerabend assumes that sciences would be more productive without methodological and theoretical regulation. Sciences should operate independently from both rationalist or critical-rationalist assumptions. His concept, even though not absolutely concept free, more likely tries to ensure several methodological approaches which are based on individual creativity (Walach 2009).

Phenomenology

The critical theory is based on the so-called phenomenological paradigm. This scientific discipline is concerned with the critical reflection of awareness processes. Phenomenology critically reflects the existing structures and considers the subject as the foundation in the epistemological process (Meidl 2009). Phenomenology could be regarded as a critical method in the social sciences which enables the researcher to evaluate both the core problem and the

structure of a phenomenon. This philosophical approach was developed by Husserl as a consequence of the increasing importance of natural sciences (Godina 2012).

Phenomenology is focused on philosophical questions regarding the existence (Zahavi 2009). In addition, phenomenology accepts philosophy as the basic discipline for its own scientific rigor. Husserl criticises both the undoubted existence of god as the knowledge basis and the principle of causality (Meidl 2009). The basic principle of phenomenology is the original perspective which is regarded as the foundation of knowledge. The interrelation between individual perspectives and knowledge could not be called into question. Thus, positivist sciences are regarded as unsuitable to examine the existence of a subject. On the contrary, examinations should be critical and should avoid scientific prejudices (Zahavi 2009). Phenomenology is completely focused on individual assumptions which are regarded as the knowledge basis. Therefore, phenomenology is based on the so-called immanent analysis which rejects both inductive and deductive theories (Meidl 2009).

The main point is the process of perception. This process distinguishes between human beings as subjects on the one hand and the research subject on the other hand. Strong connection between the researcher and the subject is required to receive in-depth knowledge (Godina 2012). Basically, Husserl's phenomenology is concerned with thoughts regarding the object rather than the physical phenomenon (Ruffing 2006). Hence, phenomenology could be regarded as a further development of earlier epistemological approaches. Husserl argues that the existing paradigms would be unsuitable to clarify reality. He rejects every type of ontological based reasoning which could result in ontological prejudices (Hufnagel 2011). According to Husserl, it is completely irrelevant if an analysed object is existing in reality or not. In phenomenology, every object is given as perceived irrespective of whether it is realised in reality or in imagination. Hence, the core critic of Husserl refers to any kind of scientific model that draws definite conclusions regarding a particular object (Zahavi 2009). In that respect, a phenomenon is the appearance of an object which is based on a particular perceptual process. This perception process varies if both the perspective of the perception and the subject itself are changing. It is possible to receive a deeper understanding of the research subject due to these different perspectives. This perceptual process is defined as the so-called intentionality and each perceptual process as the so-called intentional act (Godina 2012). The process of perspective variation is resulting in a variety of phenomenon by disregarding ontological assumptions (Hufnagel 2011). The awareness process is divided into two pieces. The first is in the process of intentionality which

refers to the direct perception of the object out of different perspectives. The second is in the reflection of these perception processes (Godina 2012). This phenomenological awareness process is presented in the subsequent figure nine.

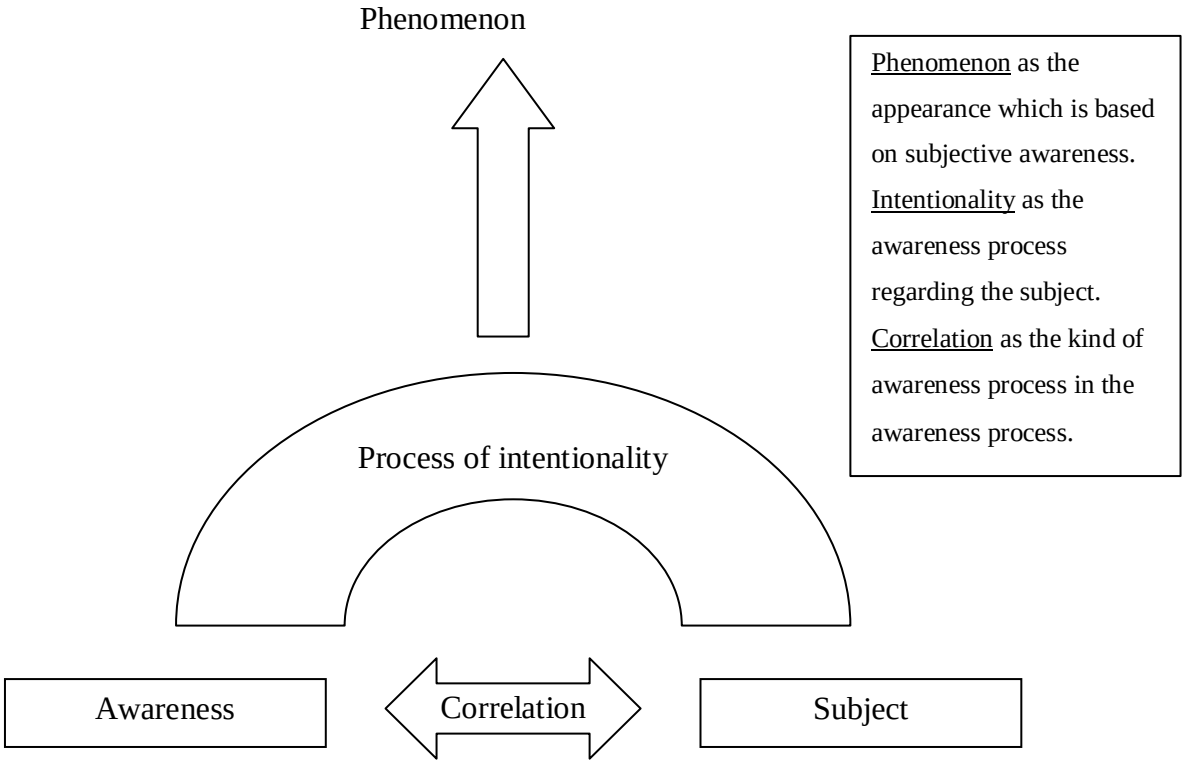


Figure 9 The phenomenological awareness process (Godina 2012, p. 33)

Independent from the rather complex process of phenomenology, every type of impression is considered as knowledge. Therefore, Husserl argues that it would be impossible to consider physical objects as being fully evident due to the ongoing perception process. The end of perspectives, perceptions and impressions is depending on themselves and not on the specificity of the physical object. In terms of avoiding dogmatic assumptions, every object must be considered in relation to the individual experiences (Zahavi 2009).

The issue of hermeneutics

Hermeneutics is defined as the theory of both understanding and interpretation, and focused on the analysis of:

- scripts and linguistic utterances;

- pictures and dreams;
- cultural utterances.

Since linguistic material often lacks clear structures and the clarification of sense, the content interpretation could result in misunderstandings. In its beginning, hermeneutics was concerned with the elementary interpretation and understanding without any in-depth analysis (Walach 2009). Hermeneutics was not regarded as important in the ancient application. Its importance increased in the subsequent phases due to both bible and legal interpretations. Understanding and interpretation of scripts were based on pure reading to grasp the text content rather than interpreting author's thoughts and intentions. Schleiermacher introduced a phase of hermeneutics due to the possibility of text misinterpretations. His method of hermeneutics requires reader's knowledge of the language, the meanings of words and the basic text context. Even though methodological rules are partly considered, the process of understanding is solely based on individual assumptions and interpretations (Brenner 2011).

Moreover, Dilthey developed a hermeneutic approach which was initially focused on the integration of both natural and social sciences. His approach is the systematic interpretation of habits and correlations in reality (Schülein and Reitze 2005). According to Dilthey, the process of understanding is a universal problem of human beings. This process is associated with the possibility of misinterpretations. Dilthey's approach is based on individual assumptions behind understanding and interpretation as it is impossible to develop methodological instructions (Brenner 2011). This type of hermeneutics is basically concerned with the understanding of foreign cultural aspects. A more recent approach of hermeneutics is associated with the concept of Gadamer. Gadamer assumes that knowledge is based on foreknowledge, which is associated with an ongoing process of both understanding and interpretation. Human beings are captured in this ongoing knowledge process and are obliged to participate (Ruffing 2006). Due to different educational backgrounds, experiences and the cultural environment, every text content is viewed, captured and interpreted differently. The process of understanding requires a minimum fore-knowledge which has to be integrated in the understanding process. In order to expand the individual knowledge basis, it is essential to accept individual knowledge gaps on the one hand and knowledge adjustments on the other hand. The process of understanding is regarded as an ongoing revision of the individual knowledge to comprehend the script content. This process is finalised at a point where the individual understanding melts together with the text content (Walach 2009). In that respect, Gadamer compares the process of understanding with a

conversation that should be based on mutual interest to understand the foreign perspective (Ruffing 2006). Gadamer follows the basic argumentation line of individual assumptions in the interpretation process but points out that earlier traditional interpretations are reconsidered (Brenner 2011). This smoothing process is defined as an infinite process, the so-called hermeneutic circle (Walach 2009). This core element of hermeneutics (Brenner 2011) is based on the interdependence of initial assumptions and final results (Schülein and Reitze 2005). This mutual justification is unending under the aspect of hermeneutics (Walach 2009). An applied hermeneutic circle is shown in figure 11 (see appendix K).

Even though hermeneutics lacks empirical evidence and is subject to individual interpretations, the approach is regarded as suitable to clarify correlations in reality (Schülein and Reitze 2005). Hermeneutics is applied in qualitative sciences and associated with several kinds of methods. These could be associated with in-depth text analyses on the one hand, text structuring on the other hand or the evaluation of particular human behaviour by narrative analysis (Walach 2009).

At this point, the clarifications regarding the research paradigms show basic differences in the conclusion process. The literature in that respect shows that Popper's approach is focused on selected items and concerned with hypotheses testing rather than the individual perspective as in the case of phenomenology. Nevertheless, neither Popper's approach of falsification, nor Husserl's phenomenology or Gadamer's approach of hermeneutics are resulting in final and definite conclusions. On the contrary, these approaches are each concerned with the further development of the knowledge base even though each is different in their procedure. In that respect, they are narrowed and logical on the one hand and more individual and open on the other hand.

Appendix J.2: The qualitative and quantitative research

Qualitative research methods are focused on the examination of complex relationships in reality. This requires the examination of subjective behaviour and its controlled interpretation in order to understand the behavioural effects in reality (Kempf 2009). The interpretative character of qualitative research is associated with the following particularities. The first is the assumption that society lacks clear structures. The second is that reality is interpreted subjectively according to individual experiences. The third is that qualitative research is neither concerned with the determination nor the examination of cause and effect relationships. The final one is that qualitative research is focused on new discoveries and the understanding of typical cases rather than with large sample sizes, hypotheses testing and generalisations. Qualitative research is based on inductive procedures to infer from the particular to the general. Hence, this type of research is regarded as truth expanding (Häder 2010).

The process of qualitative examinations is based on following principles:

- the principle of communication which requires basic knowledge in the research area;
- the principle of unselfconsciousness regarding the examination field;
- the principle of presumptions reflection (Kempf 2009).

Thus, the mission of qualitative research is the examination of subjective interpretations of reality on the one hand and the further development of these subjective assumptions on the other hand. In order to interpret subjective considerations, qualitative research methods are associated with observations, qualitative interviews and focus groups (Kempf 2008). On the other hand, quantitative research is concerned with the calculation of frequencies, distributions, probabilities and correlations. This type of research is also concerned with the clarification of regularities, and cause and effect relationships. Quantitative research is suitable to collect a representative proportion of data by structured text analyses, observations, structured interviews and surveys. Further research methods are tests and experiments, both in laboratory settings and fields (Silkenbeumer 2010). Quantitative research is based on the assumption that societies are structured in order to determine regularities and rules in reality. This requires structured research methods to avoid subjective influences during the examination process. This type of research is based on deductive reasoning to infer from the general to the particular (Häder 2010).

Appendix J.3: The issue of triangulation

The application of a quantitative or qualitative research method cannot be recommended as this decision depends on the respective research question, the research aim and the existing knowledge base (Silkenbeumer 2010). Nevertheless, there is a strong orientation in the application of quantitative methods, not only in the field of SME, innovation and public funding research, but also in the field of PE and VC. This is shown by the research results from Suman et al. (2012) who found out that the proportion of empirical-quantitative examinations in PE research increased significantly between 2005 and 2011.

Even though qualitative research is criticised due to the lack of rigidness and structure, Miles and Huberman (1994, p. 40) conclude: "But at bottom, we have to face the fact that numbers and words are both needed if we are to understand the world". Hence, the combination of qualitative and quantitative research approaches by mixed-method designs is suitable to cope with methodological limitations (Kuß 2010). Hanson et al. (2005, p. 233) observe the following regarding the suitability of mixed-method designs and supplement: "Despite numerous challenges and obstacles, it has emerged as a viable alternative to purely quantitative or qualitative methods and designs".

In the case of triangulation, the researcher examines the research object with different methodological approaches, theoretical underpinnings or by combining different types of data. The combination of different data analysis methods or the implementation of pretests to compose questionnaires is not classified as triangulation. Methodological triangulation on the one hand is applied to cope with the limitations of one method. Nevertheless, researchers must critically evaluate the suitability of each method in relation to the research field, the basic research question and the expected results. Methodological triangulation is then resulting in following compositions:

- the combination of qualitative and quantitative methods;
- the combination of different quantitative methods;
- the combination of different qualitative methods.

The chosen methods are applied concurrently or in sequence. In addition, it is possible to consider different data bases in order to address the research question. Methodological

triangulation should not only be applied to validate the research results but also for the expansion of the knowledge base (Flick 2008). As Miles and Huberman (1994, p. 41) point out: “The question, then, is not whether the two sorts of data and associated methods can be linked during the study design, but whether it should be done, how it will be done and for what purpose”. If the results due to the application of several methods are different, further theoretical and empirical explanation is required (Flick 2008).

The subsequent figure ten shows several types of research designs according to Miles and Huberman (1994).

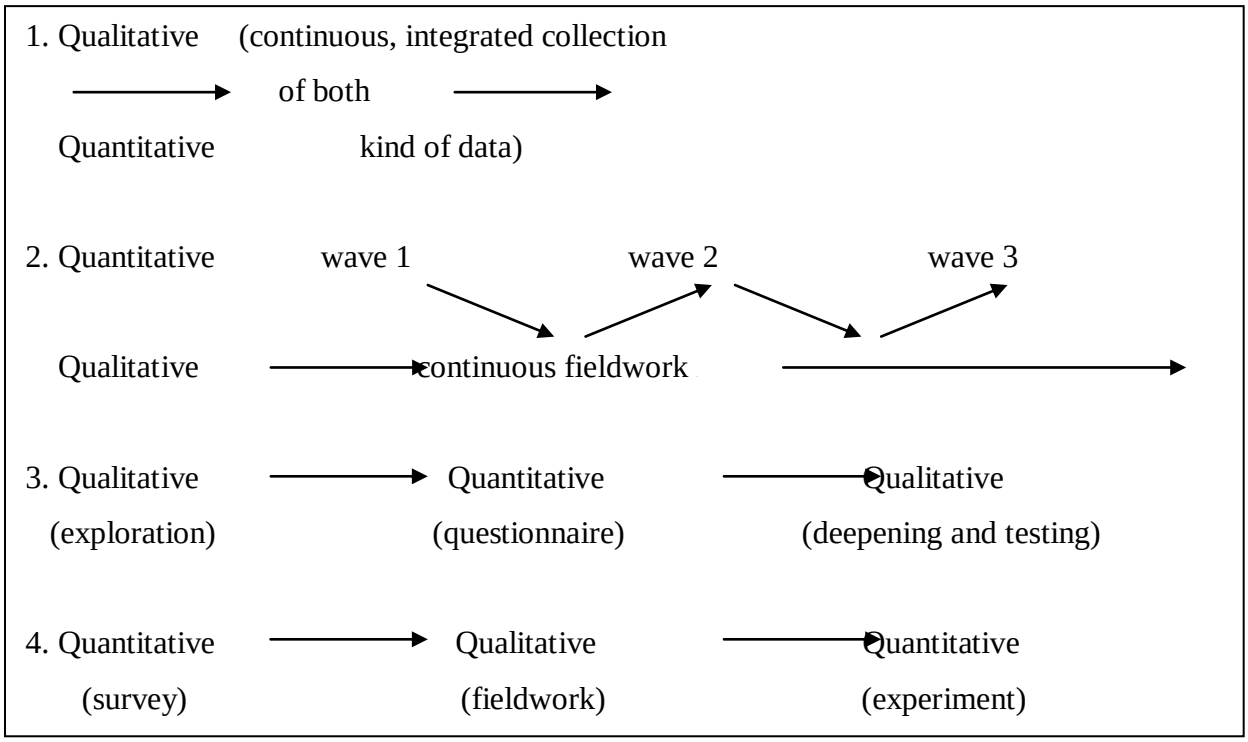


Figure 10 Linking qualitative and quantitative data (Miles and Huberman 1994, p. 41)

In the first design, the process of data collection is carried out concurrently. In the second design, both quantitative and qualitative research is concurrently carried out in waves. Such a process could be concerned with several in-depth qualitative examinations in the field which validate or expand the findings from a structured questionnaire. The structured questionnaire is adjusted and applied again. In the third design, the qualitative examination is the basis for the structured questionnaire. The questionnaire results are validated or further strengthened by additional qualitative research, for instance a focus group (Miles and Huberman 1994). Such a research design was applied successfully both by Brinkrolf (2002) regarding management support of VC

firms and Grethe (2010) regarding turnaround investments of PE firms. In the final design, a quantitative survey is carried out and followed by qualitative research for deeper examinations in the field. The final quantitative experiment could be concerned with hypotheses testing. These hypotheses might be derived from earlier study results (Miles and Huberman 1994). Concurrent research designs are also concerned with the validation of research results. Therefore, it is recommended to apply different research methods in order to prove the independence of the results from a specific research method. Sequential research designs on the other hand, in the case that quantitative research is followed by a qualitative approach, are also concerned with results expansion. Furthermore, a qualitative orientation which is applied beside a quantitative section might be applied to explore the research area, to develop hypotheses or to determine suitable instruments for the qualitative part (Kuß 2010).

Triangulation is based on the assumption that by combining several methods, the weaknesses of each method are overcompensated by the accumulation of advantages. Nevertheless, mixed-method designs are concerned with the risk of losing specialisation advantages in the case of their superficial application (Wrona and Fandel 2010).

Appendix K: The applied hermeneutic circle

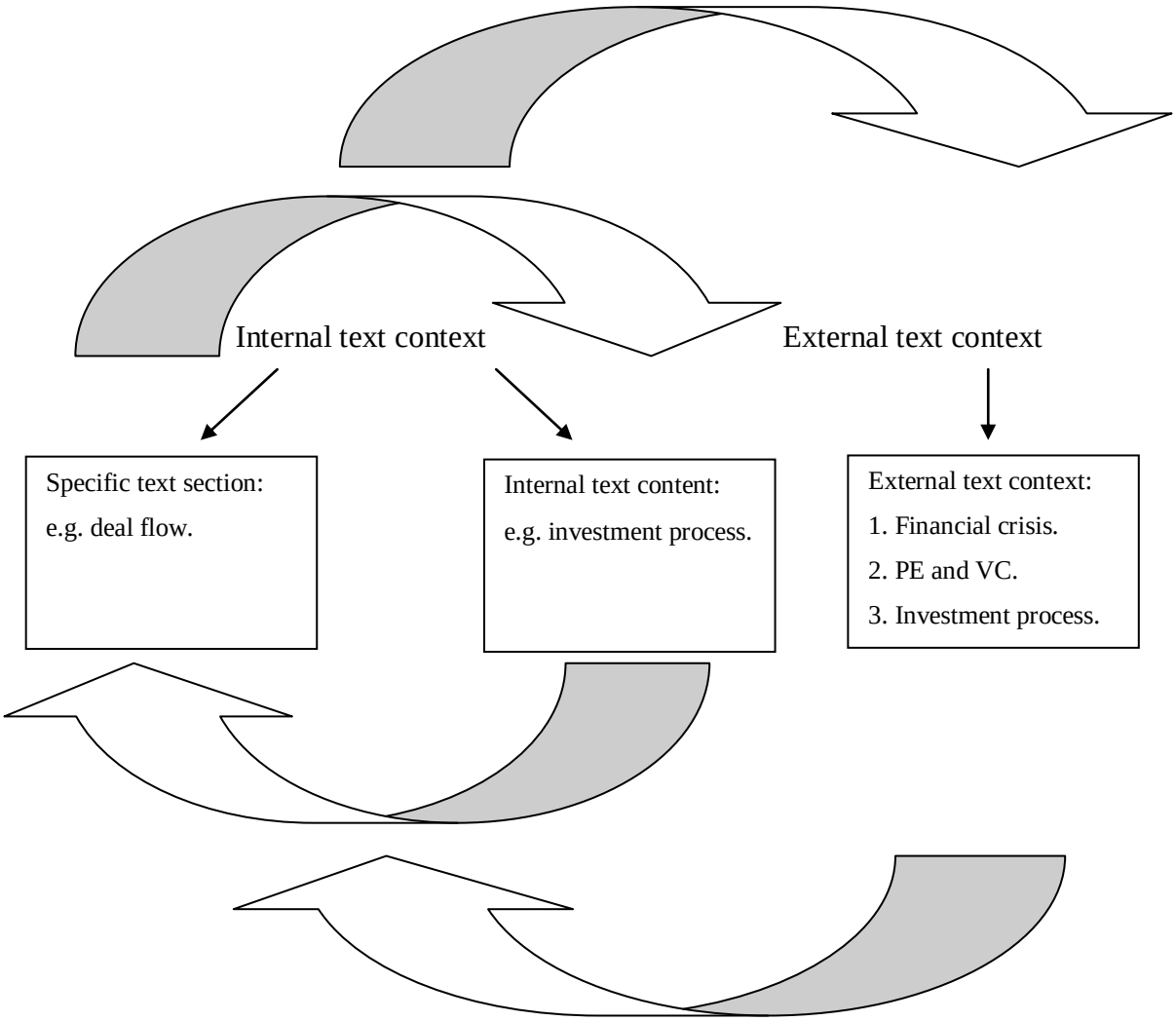


Figure 11 The applied hermeneutic circle (own development)

Appendix L.1: The sample frame of private equity and venture capital investors

The sample frame of private equity and venture capital investors		
Independent investor	Federal state	Location
Kizoo Technology Ventures	Baden-Wurttemberg	Karlsruhe
Leonardo Venture	Baden-Wurttemberg	Mannheim
Triangle Venture Capital	Baden-Wurttemberg	St. Leon-Rot
ZFHN Zukunftsfonds Heilbronn	Baden-Wurttemberg	Heilbronn
Bon Venture Management	Bavaria	Munich
Fidura Private Equity Fonds	Bavaria	Munich
Global Life Science Ventures	Bavaria	Munich
IT-Adventure	Bavaria	Starnberg
MIC AG	Bavaria	Munich
MIG Verwaltung	Bavaria	Munich
PolyTechnos Venture-Partners	Bavaria	Munich
Seventure Partners	Bavaria	Munich
SMAC Partners	Bavaria	Unterhaching
Target Partners	Bavaria	Munich
TVM Capital	Bavaria	Munich
Unternehmer TUM-Fonds Management	Bavaria	Garching
VNT Management	Bavaria	Munich
Wellington Partners	Bavaria	Munich
X Ange Private Equity	Bavaria	Munich
BMP	Berlin	Berlin
Catagonia Capital	Berlin	Berlin
Earlybird Venture Capital	Berlin	Berlin
Peppermint Venture Partners	Berlin	Berlin
Ventegis-Capital	Berlin	Berlin
BAG AG für Industriebeteiligungen	Hamburg	Hamburg
Neuhaus Partners	Hamburg	Hamburg
Pricap Venture Partners AG	Hamburg	Hamburg
Creathor Venture Management	Hesse	Bad Homburg
IDP Industrial Development Partners	Hesse	Königstein
IVC Venture Capital	Hesse	Bad Homburg
Sirius Venture Partners	Hesse	Wiesbaden
Enjoy Venture	North Rhine-Westphalia	Dusseldorf
Fundamenta Capital	North Rhine-Westphalia	Erkrath
Genes	North Rhine-Westphalia	Frechen
Glotec Ventures	North Rhine-Westphalia	Neuss
Innogy Venture Capital	North Rhine-Westphalia	Essen
Media Ventures	North Rhine-Westphalia	Cologne
T-Venture Holding	North Rhine-Westphalia	Bonn
bfu AG	Rhineland-Palatinate	Koblenz

Corporate Venture Capitalists	Federal state	Location
Bilfinger Venture Capital	Baden-Wurttemberg	Mannheim
Freudenberg Venture Capital	Baden-Wurttemberg	Weinheim
HV Holtzbrinck Ventures Adviser	Bavaria	Munich
Axel Springer Venture GmbH	Berlin	Berlin
Hasso Plattner Ventures Management	Brandenburg	Potsdam
Evonik Industries	Hesse	Hanau
DuMont Venture (Capnamic)	North Rhine-Westphalia	Cologne
BASF Venture Capital	Rhineland-Palatinate	Ludwigshafen
Savings/Cooperative/Public bank daughter	Federal state	Location
LBBW Venture Capital	Baden-Wurttemberg	Stuttgart
Wagniskapitalgesellschaft KSK	Baden-Wurttemberg	Reutlingen
Beteiligungsges. Sparkasse Freiburg	Baden-Wurttemberg	Freiburg
BWK	Baden-Wurttemberg	Stuttgart
Chancenkapitalfonds KSK Biberach	Baden-Wurttemberg	Biberach
L-EA Private Equity GmbH	Baden-Wurttemberg	Karlsruhe
S Wagnis- und Beteiligungskapital	Baden-Wurttemberg	Ludwigsburg
S-Kap Unternehmensbeteiligung	Baden-Wurttemberg	Pforzheim
Sparkassenbeteiligungsgesellschaft	Baden-Wurttemberg	Heilbronn
Süd Beteiligungen (SüdBG)	Baden-Wurttemberg	Stuttgart
Bayern Kapital	Bavaria	Landshut
BayernLB Capital Partner	Bavaria	Munich
S-Partner Kapital	Bavaria	Munich
S-Refit	Bavaria	Regensburg
IBB Beteiligungsgesellschaft	Berlin	Berlin
nwk nordwest (Spk. Bremen)	Bremen	Bremen
BC Brandenburg Capital (ILB)	Brandenburg	Potsdam
Haspa BGM (Spk. Hamburg)	Hamburg	Hamburg
VR Equitypartner	Hesse	Frankfurt/Main
Beteiligungskapital Hannover	Lower Saxony	Hannover
Nord Holding	Lower Saxony	Hannover
Equity Partners (Spk. Dusseldorf)	North Rhine-Westphalia	Dusseldorf
Kreissparkasse Köln Beteiligungen	North Rhine-Westphalia	Cologne
NRW.Bank	North Rhine-Westphalia	Dusseldorf
S VentureCapital GmbH	North Rhine-Westphalia	Dortmund
S-Siegerlandfonds	North Rhine-Westphalia	Siegen
S-UBG + S-VC	North Rhine-Westphalia	Aachen
Wagnisfinanzierungsgesellschaft	Rhineland-Palatinate	Mainz
Saarländische Wagnisfinanzierung	Saarland	Saarbrucken
SBG Sparkassenbeteiligung	Saxony-Anhalt	Barleben
GoodVent (Investitionsbank SH)	Saxony-Anhalt	Magdeburg
BSV-Beteiligungsgesellschaft	Saxony	Oelsnitz
CFH Beteiligungsgesellschaft	Saxony	Leipzig
RBB Management (Spk. Bautzen)	Saxony	Bautzen
S-Beteiligung Leipzig GmbH	Saxony	Leipzig
SBG-Sächsische Beteiligungen GmbH	Saxony	Dresden

SC-Kapitalbeteiligungsgesellschaft	Saxony	Chemnitz
SIB (Spk. Dresden)	Saxony	Dresden
bm-t Thüringen (Aufbaubank)	Thuringia	Erfurt
MBG	Federal state	Location
MBG	Baden-Wurttemberg	Stuttgart
BayBG	Bavaria	Munich
MBG	Berlin and Brandenburg	Berlin and Potsdam
BUG	Bremen	Bremen
BTG	Hamburg	Hamburg
MBG	Hesse	Frankfurt/Main
MBG	Lower Saxony	Hannover
MBMV	Mecklenburg-Western Pomerania	Schwerin
KBG	North Rhine-Westphalia	Neuss
MBG	Rhineland-Palatinate	Mainz
SKG	Saarland	Saarbrucken
MBG	Saxony-Anhalt	Magdeburg
MBG	Saxony	Dresden
MBG	Schleswig-Holstein	Kiel
MBG	Thuringia	Erfurt
Public investor	Federal state	Location
MicroMountains Venture	Baden-Wurttemberg	Villingen-Schwenningen
Fraunhofer Venture	Bavaria	Munich
Innovationsstarter Hamburg GmbH	Hamburg	Hamburg
Innovations-Capital Göttingen	Lower Saxony	Göttingen
Genius Venture Capital	Mecklenburg-Western Pomerania	Schwerin
High-Tech Gründerfund	North Rhine-Westphalia	Bonn

Table 23 The sample frame of private equity and venture capital investors (own development)

Appendix L.2: The sample frame of the BVK publications

The sample frame of the BVK publications		
Sub-category	Publication title	Published
Annual report	Annual report 2010.	2011
	Annual report 2011.	2012
	Annual report 2012.	2013
Market information	Private Equity Investor letter December 2010/January 2011.	29.12.2010
for investors	Private Equity Investor letter December 2011/January 2012.	02.01.2012
	Private Equity Investor letter December 2012/January 2013.	04.04.2013
Archives 2010	Deutsche Unternehmen setzen auch in der Krise auf Beteiligungskapital.	08.03.2010
	MBGen beweisen Stabilität in der Finanz- und Wirtschaftskrise.	12.03.2010
	Kräftiger Stimmungsaufschwung am Beteiligungsmarkt.	26.05.2010
	Deutscher Private Equity-Markt setzt Erholung fort.	27.05.2010
	Beteiligungsgesellschaften können derzeit fast 33 Mrd. Euro in mittelständische Unternehmen investieren.	11.06.2010
	Stimmung am Beteiligungsmarkt erholt sich weiter kräftig.	19.08.2010
	AIFM-Regulierung kann Finanzierung für KMUs und Innovationen erschweren.	11.11.2010
	Private Equity-Aktivitäten stabilisieren sich.	11.11.2010
	Atempause auf dem deutschen Beteiligungsmarkt.	16.11.2010
Archives 2011	Mehr als 200 Mio. EUR Beteiligungskapital der MBGen für den Mittelstand.	15.02.2011
	Deutlich mehr Private Equity-Investitionen im Jahr 2010.	02.03.2011
	12. Deutscher Eigenkapitaltag des BVK: Press release.	12.05.2011
	12. Deutscher Eigenkapitaltag des BVK: Key-Note speech Dr. Dombret: Private Equity and Basel III.	12.05.2011
	Stimmungshoch auf dem Beteiligungsmarkt.	ns
	Deutscher PE-Markt behauptet sich trotz Euro-Krise.	21.11.2011

Archives 2012	Erneut deutlich mehr Private Equity-Investitionen im Jahr 2011.	27.02.2012
	BVK begrüßt Initiative der Bundeskanzlerin zur Verbesserung der Rahmenbedingungen für VC.	01.03.2012
	Erholung am Beteiligungsmarkt setzt sich fort.	02.05.2012
	AIFM-Gesetzesentwurf für Deutschland vom BMF vorgelegt - BVK begrüßt Diskussionsentwurf.	20.07.2012
	Beteiligungsmarkt in Deutschland: Starker Stimmungseinbruch im 2. Quartal.	31.07.2012
	Stimmung am Beteiligungsmarkt erholt sich.	12.11.2012
	Deutlich mehr Investitionen im deutschen Private Equity-Markt.	12.11.2012
	Anhörung im Finanzausschuss: BVK begrüßt Initiative der Regierungsfraktionen.	19.11.2012
	AIFM-Umsetzung in Deutschland: BVK begrüßt Kabinettsentwurf.	12.12.2012
PE letter 2010	Private Equity letter February/March 2010.	05.03.2010
	Private Equity letter June/July 2010.	07.07.2010
	Private Equity letter September/October 2010.	24.09.2010
	Private Equity letter December 2010.	04.01.2011
PE letter 2011	Private Equity letter April/May 2011.	16.05.2011
	Private Equity letter September/October 2011.	10.10.2011
	Private Equity letter December 2011/January 2012.	10.01.2012
PE letter 2012	Private Equity letter March 2012/April 2012.	04.04.2012
	Private Equity letter September 2012.	17.09.2012
	Private Equity letter December 2012.	19.12.2012

Table 30 The sample frame of the BVK publications (own development)

Appendix M: Additional clarifications regarding public funding

According to a European perspective, the institutions for public funding are structured on three levels. First, the European Investment Bank and the European Bank for Reconstruction and Development as multilateral development banks on the European level. Second, the Kreditanstalt für Wiederaufbau and the Landwirtschaftliche Rentenbank as public investment banks on the federal level in Germany. Third, the public investment banks on the regional state level in Germany, which are concerned with the regional development of their home state (Keuper and Puchta 2008). These institutions are cooperating, for instance, by risk-sharing between the EIB and the KfW. Public support measures from the EU and Germany's federal level are additionally subsidised and issued by third level institutions. The regional focused institutions of this third level fulfil a leading through function for KfW programmes, issue own types of credits according to regional requirements and, moreover, issue guarantees. Hence, the public investment banks on the regional level close the gap in economic support measures due to their regional focus and competence (Asmussen 2008).

The existence of the public banks on these different levels is based on the principle of subsidiarity. This principle clarifies that public issues have to be solved by subordinate levels, whereas the superordinate levels step back. Nevertheless, this procedure does not exclude the support of the higher levels in principle which depends on local authorities competence. The principle of subsidiarity explains the three levels of economic and structural development and their mutual supplement. Different political objectives are concerned with different economic strategies and thus different types and volumes of public funding measures. Irrespective of different political objectives, public funding measures should only be applied in the case of sub-optimal market developments (Weber 2008). Therefore, in terms of avoiding distortions of competition, the legal and business framework of Germany's public investment banks was negotiated with the EC. As a result of the so-called agreement I in July 2001, it was agreed that public banks in Germany will lose their state guarantees from July 2005 on. In the aftermath of the initial agreement, the so-called agreement II was concerned with state guarantees for public banks in case that they operate in a competitively neutral manner. These agreements, inter alia, explain the consolidation of Germany's federal state banks, the so-called Landesbanken (see glossary), which lost their state guarantees from 2005 on.

According to the agreements I and II, public funding is limited to such areas in which market mechanisms fail and funding measures are supporting the overall economic welfare (Keuper and Puchta 2008). This official definition allows the following support measures. First, public funding for enterprise founding. In that case, promising and desirable enterprises are not founded due to information asymmetries and the lack of securities. This market gap justifies public support for enterprise founding. Second, support measures for innovation financing which are required due to pronounced information asymmetries between entrepreneurs and investors. Third, support measures regarding environmental investments. In that case, investments are omitted as entrepreneurs do not consider the welfare effects as a result of their environmental investments. Such investments are not resulting in additional revenues which would bear the investment costs. Fourth, public funding for research and development. Finally, public support for SME financing, as these enterprises are overall disadvantaged due to weak equity ratios and smaller financing volumes (Weber 2008). Furthermore, public investment banks are enabled to finance infrastructure projects, the public housing sector, social measures and in some cases exports (Keuper and Puchta 2008).

Weiland (2008) in that respect points out that basically every type of financing could be obtained over the capital market. Nevertheless, the risk tolerance of market participants vary from time to time, in relation to market's condition, which explains the demand and scope of public guarantees, risk capital or public mezzanine financing. Weiland (2008), furthermore, clarifies that it would be possible to refinance risky credits over the capital market too. He argues that market participants nowadays are able to evaluate the loss risk by state of the art IT systems. However, the financing of risky credits is limited at a point on which interest rates exceed the usual rate. In that case, the refinancing over the capital market is impossible and requires the intervention of public investment banks (Weiland 2008).

Schäfer and Zimmermann (2008) mention several possibilities to avoid financial constraints. The first possibility is the reduction of information asymmetries by means of rating and observation. The second is the investment in long-term relationships between entrepreneurs and banks to strengthen the trust basis. The third is adjusting credit contracts in order to sell the secured good in the case of unexpected developments. Nevertheless, Schäfer and Zimmermann (2008) also explain that these strategies have their limitations in the case of start-up and innovative companies due to the lack of historical data and securities. In addition, they clarify that banks in more recent times are exposed to increased market competition. This would explain the

importance of risk evaluation rather than the focus on customer relationships. As a result, the transformation of these measures seems rather limited.

Irrespective of the conclusions regarding capital market's ability and additional strategies to avoid financing constraints, the market of public funding was limited itself. Until 2005, it was rather unattractive for private banks to provide public subsidised loans due to a standard margin of 1%. This margin did neither bear the costs of credit risks nor of credit monitoring in the case of an average credit portfolio. As a result, private banks avoided the distribution of public credits so that in particular SMEs, start-up companies and innovative enterprises neither received private bank loans nor public credits. On the other hand, good debtors rejected public credits in the case that public conditions exceeded the market conditions. In that case, public funding measures could not fulfil their stimulating role for environmental or research and development investments. Therefore, the KfW introduced a system of risk-adjusted interest rates to boost the provision of public credits. This risk-adjusted interest rate system is associated with different margins which depend on debtor's credit standing and the scope of securities (Weiland 2008). The introduction of the interest rate system and the transformation of the so-called agreement II explain the future risk-orientation of the public investment banks. This progress was also accompanied by the launch of revolving funds to save the public resources for future generations (Keuper and Puchta 2008). Nevertheless, the introduction of risk-adjusted interest rates and the launch of revolving funds contradict the objective of public banks to settle both incomplete and imperfect markets. On the other hand, this development shows that public banks could not completely disregard market developments in order to maintain their business model. It could be, moreover, concluded that public investment banks are now more focused on qualitative investments rather than closing market gaps at any rate.

Appendix N.1: The credit and equity financing programmes of the KfW

The credit and equity financing programmes of the KfW					
Programmes	2008	2009	2010	2011	2012
	in MEUR				
Enterprise founding and SME financing:					
Unternehmerkredit	9,010	6,365	8,006	6,338	7,811
(Enterprise financing credit)					
Regionalförderprogramm	438	351	473	597	426
(Regional focused support credit for SMEs)					
Kapital für Arbeit und Investition	210	110	72	31	-
(Credit for employment and investment)					
Kapital für Gründung	138	176	179	168	138
(Enterprise founding credit)					
Kapital für Wachstum	15	4	-	-	-
(Growth credit)					
KfW Start-Geld	159	165	220	943	373
(Enterprise founding credit)					
ERP-Gründerkredit	-	-	-	-	1,961
(Enterprise founding credit)					
Filmfinanzierung	-	-	-	-	5
(Credit for film financing)					
Darlehen Bürgschaftsbanken	53	-	-	-	-
(Refinancing credit for public guarantee banks)					
Akquisitionsfinanzierung	189	229	-	89	145
(Credit for acquisition financing)					
Globaldarlehen gewerbliche Wirtschaft	-	-	-	250	-
(Refinancing measure for private banks)					
Subtotal	10,212	7,400	8,950	8,416	10,859
Equity financing programmes:					
ERP-Beteiligungsprogramm	65	66	90	83	69
(Refinancing measure for PE and VC firms)					
KfW-Risikokapitalprogramm	114	61	50	29	26
(Refinancing measure for PE and VC firms)					
KfW-Programm Beteiligung Sozialunternehmen	-	-	-	-	0
(Co-financing measure for equity investments)					
ERP-Startfund	63	71	80	70	58
(Co-financing measure for equity investments)					
Sonstige Beteiligungsprogramme	19	3	5	19	18
(Unspecified equity financing programmes)					
Subtotal	261	201	225	201	171

Innovation financing:					
ERP-Innovationsprogramm	888	1,220	814	1,309	879
(Credit for innovation projects)					
Sonderfinanzierungen F&E Luftfahrt	-	-	1,225	835	22
(R&D financing measure in the aviation sector)					
Subtotal	888	1,220	2,039	2,144	901
Financial crisis related measures:					
KfW Sonderprogramm	-	7,162	6,176	691	-
(Financial crisis related credit programme)					
Sonderfinanzierungen Maßnahmepaket	-	786	-	-	-
(Special purpose financing)					
Subtotal	0	7,948	6,176	691	0
Total	**11,361**	**16,769**	**17,390**	**11,452**	**11,931**

Table 49 The credit and equity financing programmes of the KfW
(derived from KfW 2010a; KfW 2011a; KfW 2012a; KfW 2013a)

Appendix N.2: The summary of the KfW annual reports

The summary of the KfW annual reports					
Programmes	2008	2009	2010	2011	2012
	in MEUR				
Enterprise founding and SME financing:					
Investitions- und Gründungskredite	9,970	7,171	8,950	8,077	10,714
(Investment and enterprise founding credits)					
Sonder- und Einzelfinanzierungen	242	229	0	339	145
(Special purpose financing measures)					
Subtotal	10,212	7,400	8,950	8,416	10,859
Innovation financing:					
ERP-Innovationsprogramm	888	1,220	814	1,309	879
(Credit for innovation projects)					
Sonderfinanzierungen F&E Luftfahrt	-	-	1,225	835	22
(R&D financing measure in the aviation sector)					
Subtotal	888	1,220	2,039	2,144	901
Equity financing programmes	261	201	225	201	171
Subtotal	261	201	225	201	171
Total I	**11,361**	**8,821**	**11,214**	**10,761**	**11,931**
Financial crisis related measures	-	**7,948**	**6,176**	**691**	-
Total II	**11,361**	**16,769**	**17,390**	**11,452**	**11,931**

Table 50 The summary of the KfW annual reports (own development)

Appendix O: The results for the Mittelständische Beteiligungsgesellschaften

The turnover thresholds of MBGs investment targets		
n=5	Minimum	Maximum
	turnover in MEUR	
Max	17	500
Min	1	25
Range	16	475
Median	10	50
Mean	9.3	185.0
Variance	64.3	43,625.0
Deviation	8.0	208.9
Responses	3	5

Table 89 The turnover thresholds of MBGs investment targets (own development)

The progress of turnover thresholds between 2010 and 2012			
n=6	Minimum turnover		
	Decreased	Increased	Unchanged
Responses	1	1	4
Proportion	17%	17%	67%
	Maximum turnover		
Responses	0	3	3
Proportion	0%	50%	50%

Table 90 The progress of turnover thresholds between 2010 and 2012 (own development)

The number of MBGs portfolio companies			
Year	2010	2011	2012
Total	2,245	2,277	2,282
Max	1,101	1,109	1,095
Min	19	20	18
Range	1,082	1,089	1,077
Median	275.0	282.5	294.5
Mean	374.2	379.5	380.3
Variance	169,576.6	172,134.7	169,149.9
Deviation	411.8	414.9	411.3
n	6	6	6

Table 91 The number of MBGs portfolio companies (own development)

The number of MBGs investments			
Year	2010	2011	2012
Total	382	366	341
Max	151	156	127
Min	3	3	2
Range	148	153	125
Median	80.0	80.0	80.0
Mean	76.4	73.2	68.2
Variance	4,256.8	4,180.7	3,009.7
Deviation	65.2	64.7	54.9
n	5	5	5

Table 92 The number of MBGs investments (own development)

The fund volume of the MBGs in MEUR			
Year	2010	2011	2012
Total	189	192	188
Max	102	105	101
Min	37	37	37
Range	65	68	64
Median	50.0	50.0	50.0
Mean	62.9	64.0	62.6
Variance	1,188.2	1,303.0	1,152.1
Deviation	34.5	36.1	33.9
n	3	3	3

Table 93 The fund volume of the MBGs in MEUR (own development)

The total investment volume of the MBGs in MEUR			
Year	2010	2011	2012
Total	116	120	113
Max	51	52	45
Min	2	2	2
Range	49	50	43
Median	12.3	10.5	13.7
Mean	19.4	20.0	18.9
Variance	422.3	495.4	344.1
Deviation	20.5	22.3	18.5
n	6	6	6

Table 94 The total investment volume of the MBGs in MEUR (own development)

The average investment volume of the MBGs in MEUR			
Year	2010	2011	2012
Average investment volume per MBG	19.4	20.0	18.9
Average number of investments per MBG	76.4	73.2	68.2
Average investment volume per deal	0.254	0.273	0.277

Table 95 The average investment volume of the MBGs in MEUR (own development)

The syndication proportion of the MBGs			
Year	2010	2011	2012
Max	70	70	70
Min	20	20	20
Range	50	50	50
Median	40.0	40.0	40.0
Mean	42.5	42.5	42.5
Variance	491.7	491.7	491.7
Deviation	22.2	22.2	22.2
n	4	4	4

Table 96 The syndication proportion of the MBGs (own development)

The MBGs BP components' relevance at survey moment				
(Scale: 1 less important to 5 very important)				
Review field	n	Rank	Mean	Deviation
Management team	6	1	4.8	0.4
Market & Competition	6	2	4.7	0.5
Strategy	6	3	4.5	0.8
Product & Service	6	3	4.5	0.5
Financial forecast	6	4	4.2	0.4
Marketing & Sales	6	5	4.0	0.6
Finance & Controlling	6	5	4.0	0.0
Human resources	6	6	3.8	0.4
Research & Development	6	7	3.5	0.5
Completeness & Coherence	6	7	3.5	0.5
Organisation	6	8	3.3	0.8

Table 97 The MBGs BP components' relevance at survey moment (own development)

The MBGs BP components' development between 2010 and 2012				
Review field's importance	n	Decreased	Increased	Unchanged
Human resources	6	0%	33%	67%
Finance & Controlling	6	0%	33%	67%
Management team	6	0%	17%	83%
Marketing & Sales	6	0%	17%	83%
Strategy	6	0%	17%	83%
Financial forecast	6	0%	17%	83%
Product & Service	6	0%	0%	100%
Market & Competition	6	0%	0%	100%
Research & Development	6	0%	0%	100%
Completeness & Coherence	6	0%	0%	100%
Organisation	6	17%	0%	83%

Table 98 The MBGs BP components' development between 2010 and 2012 (own development)

The MBGs DD components' relevance at survey moment				
(Scale: 1 less important to 5 very important)				
Review field	n	Rank	Mean	Deviation
Management team	5	1	4.8	0.4
Strategy	5	2	4.4	0.9
Product & Service	5	2	4.4	0.5
Marketing & Sales	5	3	4.0	0.7
Finance & Controlling	5	3	4.0	0.0
Human resources	5	4	3.8	0.8
Research & Development	5	5	3.2	0.4
Organisation	5	5	3.2	0.4

Table 99 The MBGs DD components' relevance at survey moment (own development)

The MBGs DD components' development between 2010 and 2012				
Review field’s importance	n	Decreased	Increased	Unchanged
Management team	5	0%	40%	60%
Finance & Controlling	5	0%	40%	60%
Organisation	5	20%	20%	60%
Marketing & Sales	5	0%	20%	80%
Product & Service	5	0%	0%	100%
Strategy	5	0%	0%	100%
Research & Development	5	0%	0%	100%
Human resources	5	0%	0%	100%

Table 100 The MBGs DD components' development between 2010 and 2012 (own development)

The monitoring and mentoring of the MBGs				
(Scale: 1 not involved to 5 always involved)				
Monitoring/Mentoring area	n	Rank	Mean	Deviation
Finance & Controlling	6	1	3.3	0.5
Board establishment	6	2	2.5	1.0
Strategy development	6	2	2.5	1.0
Management recruitment	6	3	2.3	1.4
Management coaching	6	4	2.2	0.8
Strategy implementation	6	4	2.2	1.0
Marketing & Sales	6	5	2.0	1.3
Human resources	6	5	2.0	0.9
Procurement & Production	6	6	1.5	0.8

Table 101 The monitoring and mentoring of the MBGs (own development)

Appendix P: The results of the comparison analysis

The investments of PSIs at survey moment				
Type of investor	MBG	Public	Counts	Proportion
n=12 (multiple selection)				
Type of investment:				
Silent investments	6	4	10	83%
Minority investments	3	6	9	75%
Open investments	1	2	3	25%
Majority investments	0	1	1	8%
Type of investor	Independent	CVC	Counts	Proportion
n=11 (multiple selection)				
Minority investments	4	6	10	91%
Open investments	2	3	5	45%
Silent investments	1	3	4	36%
Majority investments	2	1	3	27%

Table 102 The investments of PSIs at survey moment (own development)

The investment classes of PSIs at survey moment							
Classification	from	to	MBG	Public	Total	Proportion	Cumulated
	in TEUR						
1	100	499	1	2	3	25%	25%
2	500	1,500	4	3	7	58%	83%
3	1,501	4,999	1	0	1	8%	92%
4	5,000	14,999	0	1	1	8%	100%
5	15,000	25,000	0	0	0	0%	
6	25,001		0	0	0	0%	
n			6	6	12	100%	
Classification	from	to	Independent	CVC	Total	Proportion	Cumulated
	in TEUR						
1	100	499	1	0	1	9%	9%
2	500	1,500	2	2	4	36%	45%
3	1,501	4,999	0	4	4	36%	82%
4	5,000	14,999	1	0	1	9%	91%
5	15,000	25,000	1	0	1	9%	100%
6	25,001		0	0	0	0%	
n			5	6	11	100%	

Table 103 The investment classes of PSIs at survey moment (own development)

PSIs selection of industry branches				
Type of investor	MBG	Public	Counts	Proportion
n=12 (multiple selection)				
Industry branches:				
Mechanics/Industry automation	6	6	12	100%
Software/IT	6	6	12	100%
Electronics	6	5	11	92%
Pharma/Medicine/Biotech	6	3	9	75%
Telco/Internet	5	4	9	75%
Energy/Water/Environment	6	3	9	75%
Chemistry	5	3	8	67%
Consumer goods and retail	6	1	7	58%
Logistics	5	2	7	58%
Services including consulting	4	1	5	42%
Financial Services	3	1	4	33%
Other (advanced materials)	0	0	0	0%
Type of investor	Independent	CVC	Counts	Proportion
n=11 (multiple selection)				
Mechanics/Industry automation	3	3	6	55%
Software/IT	4	2	6	55%
Electronics	1	4	5	45%
Pharma/Medicine/Biotech	2	3	5	45%
Telco/Internet	3	2	5	45%
Energy/Water/Environment	2	2	4	36%
Chemistry	0	4	4	36%
Consumer goods and retail	0	2	2	18%
Services including consulting	1	1	2	18%
Financial Services	0	1	1	9%
Other (advanced materials)	0	1	1	9%
Logistics	0	0	0	0%

Table 104 PSIs selection of industry branches (own development)

The number of PSIs portfolio companies			
MBG/Public investors			
Year	2010	2011	2012
Total	2,472	2,516	2,519
Max	1,101	1,109	1,095
Min	13	16	18
Range	1,088	1,093	1,077
Median	75.0	83.0	80.0
Mean	224.7	228.7	229.0
Variance	114,729.6	116,463.4	115,166.2
Deviation	338.7	341.3	339.4
n	11	11	11
Independent/CVC			
Year	2010	2011	2012
Total	255	263	304
Max	100	100	100
Min	7	7	7
Range	93	93	93
Median	20.0	20.0	19.5
Mean	31.9	32.9	30.4
Variance	1,044.4	1,051.3	874.5
Deviation	32.3	32.4	29.6
n	8	8	10

Table 105 The number of PSIs portfolio companies (own development)

The number of PSIs investments			
MBG/Public investors			
Year	2010	2011	2012
Total	406	387	373
Max	151	156	127
Min	2	2	2
Range	149	154	125
Median	7.0	6.0	11.0
Mean	40.6	38.7	37.3
Variance	3,318.3	3,182.7	2,406.9
Deviation	57.6	56.4	49.1
n	10	10	10
Independent/CVC			
Year	2010	2011	2012
Total	65	55	59
Max	19	14	16
Min	1	1	1
Range	18	13	15
Median	3.0	3.0	4.0
Mean	7.2	6.1	6.6
Variance	49.9	29.1	25.3
Deviation	7.1	5.4	5.0
n	9	9	9

Table 106 The number of PSIs investments (own development)

The fund volume of PSIs in MEUR			
MBG/Public investors			
Year	2010	2011	2012
Total	545	619	1,060
Max	105	140	400
Min	10	10	10
Range	95	130	390
Median	73.0	73.5	101.0
Mean	68.1	77.4	117.7
Variance	1,446.2	2,472.6	13,806.0
Deviation	38.0	49.7	117.5
n	8	8	9
Independent/CVC			
Year	2010	2011	2012
Total	1,015	1,043	1,330
Max	600	600	600
Min	15	15	15
Range	585	585	585
Median	75.0	100.0	100.0
Mean	145.0	149.0	147.8
Variance	43,016.7	42,395.3	33,131.9
Deviation	207.4	205.9	182.0
n	7	7	9

Table 107 The fund volume of PSIs in MEUR (own development)

The investment volume of PSIs in MEUR			
MBG/Public investors			
Year	2010	2011	2012
Total	177	184	162
Max	51	52	45
Min	2	1	2
Range	49	51	43
Median	5.3	4.0	7.0
Mean	16.1	16.7	14.7
Variance	377.9	456.3	264.2
Deviation	19.4	21.4	16.3
n	11	11	11
Independent/CVC			
Year	2010	2011	2012
Total	210	247	297
Max	80	80	100
Min	10	11	5
Range	70	69	95
Median	50.0	62.8	25.0
Mean	41.9	49.4	42.4
Variance	761.9	928.2	1,603.1
Deviation	27.6	30.5	40.0
n	5	5	7

Table 108 The investment volume of PSIs in MEUR (own development)

The syndication proportion of PSIs			
MBG/Public investors			
Year	2010	2011	2012
Max	83	72	90
Min	20	20	20
Range	63	52	70
Median	32.5	32.5	34.0
Mean	42.9	40.9	45.1
Variance	519.0	427.6	559.0
Deviation	22.8	20.7	23.6
n	8	8	8
Independent/CVC			
Year	2010	2011	2012
Max	100	100	100
Min	29	25	17
Range	71	75	83
Median	90.0	90.0	95.0
Mean	75.6	75.0	77.1
Variance	844.0	908.3	986.1
Deviation	29.1	30.1	31.4
n	7	7	8

Table 109 The syndication proportion of PSIs (own development)

The initial review areas of PSIs at survey moment				
(Scale: 1 less important to 5 very important)				
MBG/Public investors	n	Rank	Mean	Deviation
Review fields:				
Management team	12	1	4.6	0.9
Strategy	12	2	4.3	1.3
Market & Competition	12	3	4.2	0.8
Product & Service	12	3	4.2	0.8
Marketing & Sales	12	4	3.7	0.9
Finance & Controlling	12	4	3.7	0.9
Financial forecast	12	4	3.7	1.1
Research & Development	12	5	3.6	0.7
Completeness & Coherence	12	6	3.4	0.7
Human resources	12	6	3.4	0.8
Organisation	12	7	3.3	0.9
Independent/CVC				
Management team	10	1	5.0	0.0
Market & Competition	10	2	4.5	0.5
Strategy	10	3	4.3	0.8
Product & Service	10	3	4.3	0.5
Marketing & Sales	10	4	3.9	0.6
Completeness & Coherence	9	5	3.8	1.0
Human resources	10	5	3.8	0.9
Financial forecast	10	6	3.7	0.7
Research & Development	10	7	3.6	0.7
Finance & Controlling	10	8	3.5	1.3
Organisation	10	9	3.4	0.8

Table 110 The initial review areas of PSIs at survey moment (own development)

The detailed analysis areas of PSIs at survey moment				
(Scale: 1 less important to 5 very important)				
MBG/Public investors	n	Rank	Mean	Deviation
Review fields:				
Management team	11	1	4.5	0.9
Strategy	11	2	4.3	0.9
Product & Service	11	3	4.0	1.1
Marketing & Sales	11	4	3.7	1.1
Finance & Controlling	11	5	3.6	0.8
Research & Development	11	6	3.3	0.9
Human resources	11	7	3.2	1.3
Organisation	11	8	3.1	0.9
Independent/CVC				
Management team	10	1	4.9	0.3
Product & Service	10	2	4.6	0.5
Strategy	10	3	4.5	0.5
Marketing & Sales	10	4	4.1	0.3
Finance & Controlling	10	5	3.9	0.9
Human resources	10	6	3.6	1.1
Organisation	10	7	3.5	0.7
Research & Development	10	7	3.5	0.7

Table 111 The detailed analysis areas of PSIs at survey moment (own development)

The break-off reasons of PSIs between 2010 and 2012		
	MBG/Public investors	Independent/CVC
Rank	Year 2010	
1	No investor realised the deal	No investor realised the deal
2	Other reasons	Particular contract right
3	Deal finalised by competitor	Deal finalised by competitor
4	Particular contract right	Other reasons
n=13		
Rank	Year 2011	
1	No investor realised the deal	No investor realised the deal
2	Other reasons	Particular contract right
3	Deal finalised by competitor	Other reasons
4	Particular contract right	Deal finalised by competitor
n=13		
Rank	Year 2012	
1	No investor realised the deal	No investor realised the deal
2	Other reasons	Particular contract right
3	Deal finalised by competitor	Deal finalised by competitor
4	Particular contract right	Other reasons
n=16		

Table 112 The break-off reasons of PSIs between 2010 and 2012 (own development)

The monitoring and mentoring of PSIs				
(Scale: 1 not involved to 5 always involved)				
MBG/Public investors	n	Rank	Mean	Deviation
Mentoring areas:				
Finance & Controlling	12	1	3.3	0.7
Strategy development	12	2	3.1	1.1
Board establishment	12	3	2.9	1.0
Management recruitment	12	4	2.6	1.1
Strategy implementation	12	5	2.5	1.1
Management coaching	12	6	2.1	1.0
Marketing & Sales	12	6	2.1	1.1
Human resources	12	7	1.9	0.8
Procurement & Production	12	8	1.7	0.9
Independent/CVC				
Board establishment	9	1	4.4	0.9
Strategy development	9	2	3.9	0.8
Management recruitment	9	2	3.9	0.9
Finance & Controlling	9	3	3.8	0.8
Management coaching	9	4	3.6	1.0
Human resources	9	5	3.4	1.1
Marketing & Sales	9	6	3.2	0.8
Strategy implementation	9	7	2.8	0.7
Procurement & Production	9	8	2.4	0.9

Table 113 The monitoring and mentoring of PSIs (own development)

The exit channel proportions of PSIs between 2010 and 2012					
Exit channels	Trade sales	Secondary purchases	IPOs	Buy-backs	Total losses
Year 2010					
MBG/Public investors					
n	5	2	1	8	7
Mean	24.0	3.0	75.0	60.5	16.4
Median	10.0	3.0	75.0	85.0	10.0
Deviation	31.9	2.8	#DIV/0!	38.8	19.5
Independent/CVC					
n	5	1	1	4	4
Mean	58.0	10.0	25.0	45.0	23.8
Median	50.0	10.0	25.0	32.5	20.0
Deviation	31.3	#DIV/0!	#DIV/0!	37.6	20.6
Year 2011					
MBG/Public investors					
n	4	1	0	8	6
Mean	11.3	5.0	#DIV/0!	82.5	15.0
Median	10.0	5.0	#Number!	87.5	7.5
Deviation	7.5	#DIV/0!	#DIV/0!	24.8	22.3
Independent/CVC					
n	5	1	0	4	4
Mean	73.0	10.0	#DIV/0!	32.5	23.8
Median	80.0	10.0	#Number!	32.5	20.0
Deviation	29.5	#DIV/0!	#DIV/0!	14.4	20.6
Year 2012					
MBG/Public investors					
n	4	2	0	9	8
Mean	13.8	32.5	#DIV/0!	62.7	27.0
Median	15.0	32.5	#Number!	80.0	10.0
Deviation	7.5	38.9	#DIV/0!	35.0	36.0
Independent/CVC					
n	4	2	1	4	5
Mean	53.8	30.0	30.0	32.5	33.0
Median	50.0	30.0	30.0	32.5	20.0
Deviation	18.9	28.3	#DIV/0!	14.4	38.7

Table 114 The exit channel proportions of PSIs between 2010 and 2012 (own development)

Appendix Q.1: The validation study's invitation letter

Edinburgh Business School/ Heriot-Watt University
Edinburgh, Scotland, EHI4 4AS

Research findings on Germany's PE and VC market

A study has been conducted on developments in Germany's PE and VC market during the post-crisis phase in 2010, 2011 and 2012. The study was focused on small and medium-sized enterprise financing and venture capital investments. In that respect, the study was examining the investment behaviour, the investment activity and the changes along the investment process.

The main results of this study are in the table enclosed. It would be of great help if you would be willing to indicate whether the findings of this study were congruent with your experience. So the table also forms a brief questionnaire and you are kindly asked to send your feedback by mail, e-mail or fax to:

Christian Schlamp
Schwarzwaldstraße 20
D-65232 Taunusstein
E-Mail: CSchlamp@T-Online.de
Fax: (03222) 1427506

In the case that you prefer an interview, please be so kind and indicate a specific time on which we may contact you.

Please feel free to contact Christian Schlamp on 0160-98458358 or CSchlamp@T-Online.de for further information regarding this project.

Your feedback is considered for scientific purposes only and the results are treated with absolute confidentiality.

Thank you very much for your participation.

Appendix Q.2: The validation study's questionnaire

Main study results on Germany's PE and VC market

The study results regarding the investment process of PE and VC firms are presented below. Please indicate whether these results are congruent with your experience. In the case that these findings do not apply for your company, you are kindly asked for a specification. There is additional space for your remarks at the end of the presentation.

Research findings.	Meets my experience.	Experience differs.	No indication possible.
1. Dealflow. a) Banks and the network of PE and VC firms were the most important deal sources during the post-crisis phase in 2010, 2011 and 2012; based on the following selection: bank, consultants, personal network, chamber of commerce/federation, PE/VC firms, universities, auctions, others not specified.			
b) Auctions, chambers of commerce and federations were of minor or absolutely no importance in the acquisition of deals during 2010, 2011 and 2012; based on the following selection: please see 1a).			
2. Business plan screening. a) The management team, the strategy and the product or service were the most important review fields during the initial screening at the moment of the main study in 2013; based on the following selection: strategy, market & competition, product & services, management team, human resources, organisation, research & development, finance & financial forecast, business plan's completeness & coherence.			
b) The management team, the strategy and the product or service were also the most important review fields during the post-crisis phase in 2010, 2011 and 2012; based on the following selection: please see 2a).			

Research findings.	Meets my experience.	Experience differs.	No indication possible.
3. Due Diligence. a) The management team, the strategy and the product or service were the most important review fields at the moment of the main study in 2013; based on the following selection: strategy, product & service, marketing & sales, human resources, finance & financial forecast, organisation, research & development, management team.			
b) The management team, the strategy and the product or service were also the most important review fields during the post-crisis phase in 2010, 2011 and 2012; based on the following selection: please see 3a).			
4. Monitoring and mentoring. a) At the moment of the survey in 2013, PE and VC investors were most involved in board establishment, finance & controlling and strategy definition; based on the following selection: strategy definition, strategy implementation, procurement & production, marketing & sales, finance & controlling, human resources, board establishment, management recruiting, management coaching.			
b) The mentoring extent of PE and VC investors during 2010 to 2012 remained unchanged and hence investors neither increased nor decreased their overall involvement.			
5. Effects of the Basel III implementation. • The implementation of Basel III has no influence on the selection of portfolio companies due to a specific industry sector membership. Specific industry sectors are neither preferred, disadvantaged or completely excluded.			
6. Implementation of the AIFM-directive into national law. • The implementation of the AIFM-directive into national law in 2012, has no effect on the processes of business plan screening, the due diligence or the monitoring and mentoring of portfolio companies.			

Space for your comments:

7. Please state your ownership structure?

Please choose one item.

- ☐ Independent (diverse shareholder structure)
- ☐ Captive (Corporate Venture Capital firm)
- ☐ MBG (Mittelständische Beteiligungsgesellschaft)
- ☐ Public (shareholders are: federal states, universities, public banks, etc.)

8. Please indicate the founding year of your company.

_____

9. Please indicate the financing focus of your company.

Multiple selection is possible.

- ☐ Seed
- ☐ Start-up
- ☐ Expansion
- ☐ Bridge & Replacement
- ☐ MBI & MBO
- ☐ Turnaround

10. What is your current position in the firm?

_____

Thank you very much for your participation.

Appendix Q.3: The validation study questionnaire of the MBGs

Main study results on Germany's PE and VC market

(The Mittelständische Beteiligungsgesellschaften in Germany's federal states.)

Research findings for the Mittelständische Beteiligungs-gesellschaften.	Meets my experience.	Experience differs.	No indication possible.
1. Dealflow. a) Banks, consultants and the network of the MBGs were the most important deal sources during 2010, 2011 and 2012; based on the following selection: banks, consultants, auctions, network, chambers of commerce/federations, PE/VC firms, universities, other resources not specified.			
b) Auctions, chambers of commerce/federations and universities were of minor or absolutely no importance for the acquisition of deals in 2010, 2011 and 2012; based on the following selection: please see 1a).			
2. Business plan screening. a) At the moment of the main study in 2013, the management team, the market & competition, the strategy and the product/service were the most important review fields during the initial screening; based on the following selection: strategy, market & competition, product/service, marketing & sales, management team, human resources, organisation, research & development, financial forecast, finance & controlling, business plan's completeness & coherence.			
b) The importance of these most important review fields remained unchanged during the past years. As a result, the rank order of the review fields did neither change in their entirety nor with regard to the most important review fields.			

Research findings for the Mittelständische Beteiligungs-gesellschaften.	Meets my experience.	Experience differs.	No indication possible.
3. Due Diligence. a) At the moment of the main study in 2013, the management team, the strategy and the product/service were the most important review fields of the due diligence; based on the following selection: strategy, product/service, marketing & sales, human resources, finance & controlling, financial forecast, organisation, research & development, management team.			
b) The importance of these most important review fields remained unchanged during the past years. As a result, the rank order of the review fields did neither change in their entirety nor with regard to the most important review fields.			
4. Monitoring and mentoring. • At the moment of the main study in 2013, the most important mentoring areas of the MBGs were finance & controlling, board establishment and strategy development; based on the following selection: human resources, procurement, production, marketing & sales, strategy implementation, management recruitment, board establishment, strategy development and finance & controlling.			
5. Effects of Basel III. • The implementation of Basel III has no influence on the selection of portfolio companies due to a specific industry sector membership. Specific industry sectors are neither preferred, disadvantaged or completely excluded.			
6. Implementation of the AIFM-directive. • The implementation of the AIFM-directive into national law has no effect on the processes of business plan screening, the due diligence or the monitoring and mentoring of portfolio companies.			

7. Founding year of the MBG:

_____

8. Current position in the firm:

_____

9. Interview date and interview duration:

_____

Room for additional indications:

Appendix R: The venture capital write-off proportions

The venture capital write-off proportions[1)]										
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	**Average**
Country										
Germany	27.3%	21.2%	24.2%	31.6%	36.9%	52.5%	30.4%	27.6%	18.9%	**30.1%**
UK	18.1%	8.9%	22.0%	14.4%	4.4%	12.5%	4.9%	12.4%	9.5%	**11.9%**
France	-	5.0%	5.9%	4.2%	6.1%	19.9%	20.2%	13.0%	5.4%	**10.0%**
Europe	12.3%	11.9%	19.1%	15.7%	13.7%	27.1%	16.0%	17.9%	143.0%	**16.4%**

1) Based on market statistics.

Table 145 The venture capital write-off proportions (derived from InvestEurope 2016)

Appendix S.1: The public venture capital measures on the federal level

The public venture capital measures on the federal level					
No.	Year of introduction	Term of the funding measure	Financing focus/ fund type	Volume in MEUR	Additional information
1.	2004	ERP/EIF Fund of Fund	Venture capital/ fund of fund	1.700	1.700 MEUR on payments until 2016; fund volume 3.2 BEUR; fund's volume is partly reserved for additional funding measures.
2.	2005	High-Tech Gründerfund I	Seed, start-up/ direct investments, PPP	202	Public deposits; see calculation in table 149 (appendix S.3).
3.	2005	ERP-Startfund	Start-up, expansion/ co-investment fund	250	Fund's introduction.
	Subtotal			2.152	
4.	2009	ERP-Startfund	Start-up, expansion/ co-investment fund	220	Additional public deposits.
5.	2009	High-Tech Gründerfund I	Seed, start-up direct investment, PPP	-	Prolongation of funds investment period.
	Subtotal			220	
6.	2010	Equity fund for Germany	Growth/ direct investments, PPP	500	KfW and Commerbank cooperation.
7.	2011	High-Tech Gründerfund II	Seed, start-up/ direct investments, PPP	285	Public deposits; see calculation in table 149 (appendix S.3).
8.	2011	ERP-Startfund	Start-up, expansion/ co-investment fund	250	Additional public deposits.
9.	2012	European Angels Fund	Start-up, expansion/ co-investment fund	270	Funding from the ERP/EIF Fund of Fund; see measure no. 1.
10.	2012	Equity financing fund for social enterprises	Later-stage/ co-investment fund	2	Estimation based on KfW support reports.
	Subtotal			1.307	

No.	Year of introduction	Term of the funding measure	Financing focus/ fund type	Volume in MEUR	Additional information
11.	2013	Investment grant for BAs	Start-up, expansion/ public subsidy	150	Public subsidy for business angels.
12.	2013	ERP/EIF Mezzanine-Fund of Fund for Germany I	Mezzanine financing/ fund of fund	200	Cooperation of the EIF, the BMWi and the public investment banks of Bavaria and North Rhine-Westphalia.
13.	2015	ERP-VC fund investment	Expansion/ fund of fund	400	KfW fund for investments in private venture capital funds.
14.	2016	ERP/EIF Mezzanine-Fund of Fund for Germany II	Mezzanine financing/ fund of fund	400	Cooperation of the EIF, the BMWi and the public investment banks of Bavaria and North Rhine-Westphalia.
15.	2016	ERP/EIF growth facility	Expansion/ co-investment fund	500	Public fund for co-investments in technological enterprises.
16.	2016	Coparion	Start-up, expansion/ co-investment fund	225	KfW daughter company; successor of the ERP-Startfund; additional public deposits.
17.	2017	High-Tech Gründerfund III	Seed, start-up, expansion/ direct investments, PPP	285	Public deposits; see calculation in table 149 (appendix S.3).
18.	2017	Investment grant for BAs	Start-up, expansion/ public subsidy	-	Programme modification.
Subtotal				2.160	
Total				**5.839**	

Table 147 The public venture capital measures on the federal level

(own development; derived from the literature in table 148 in appendix S.2)

Appendix S.2: The literature base of the venture capital measures

The literature base of the venture capital measures	
Measure number in table 147	Information basis of the respective funding measure
1.	BMBF (2016)
	EIF (2016)
2.	High-Tech Gründerfund (2013)
	Geyer et al. (2016)
	High-Tech Gründerfund (2017)
3.	BMWi (2010)
	BMBF (2012)
	KfW (2012)
4.	BMWi (2010)
5.	BMWi (2010)
6.	Innovations-Report.de (2010)
7.	BMWi (2012)
	BMBF (2014)
8.	KfW (2012)
9.	BMWi (2017a)
10.	KfW (2014)
	KfW (2015)
	KfW (2016)
	KfW (2017)
11.	BMWi (2013)
12.	BMWi (2017a)
	BMWi (2017b)
13.	KfW (2017a)
14.	BMWi (2017a)
	BMWi (2017b)
15.	BMWi (2017a)
16.	BMBF (2016)
	KfW (2017b)
17.	High-Tech Gründerfund (2017)
18.	Bafa (2017)

Table 148 The literature base of the venture capital measures (own development)

Appendix S.3: The net volumes of the High-Tech Gründerfunds I, II, III

The net volumes of the High-Tech Gründerfunds I, II, III					
Fund name	Year of introduction	Private deposits[1)]	Gross fund volume	Private investments	Net fund volume
			in MEUR		
HTGF I	2005	8%	220	17.6	202.4
HTGF II	2011	5%	300	15.0	285.0
HTGF III	2017	5%	300	15.0	285.0
Total			**820**	**47.6**	**772.4**

1) Derived from Geyer et al. (2016) and own estimations for HTGF II and HTGF III.

Table 149 The net volumes of the High-Tech Gründerfunds I, II, III (derived from BMWi 2012; BMBF 2014; Geyer et al. 2016; High-Tech Gründerfund 2017; own calculations)